筭法天生法

一十六

419
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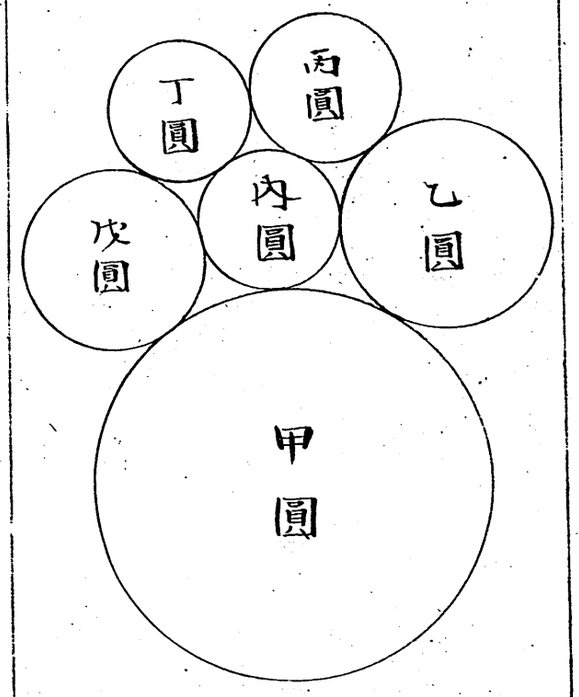
1-226

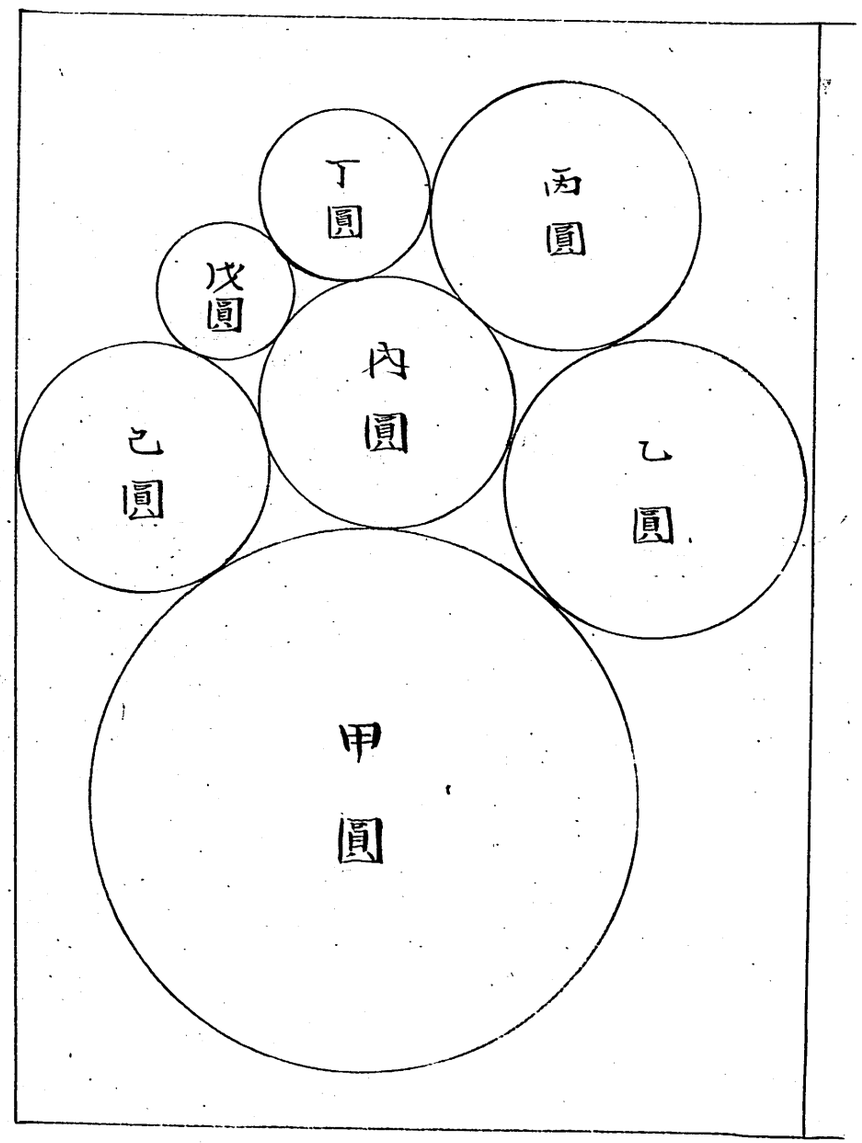
筭法天生卷之一十六

最上流　會田筭左衛門安明編



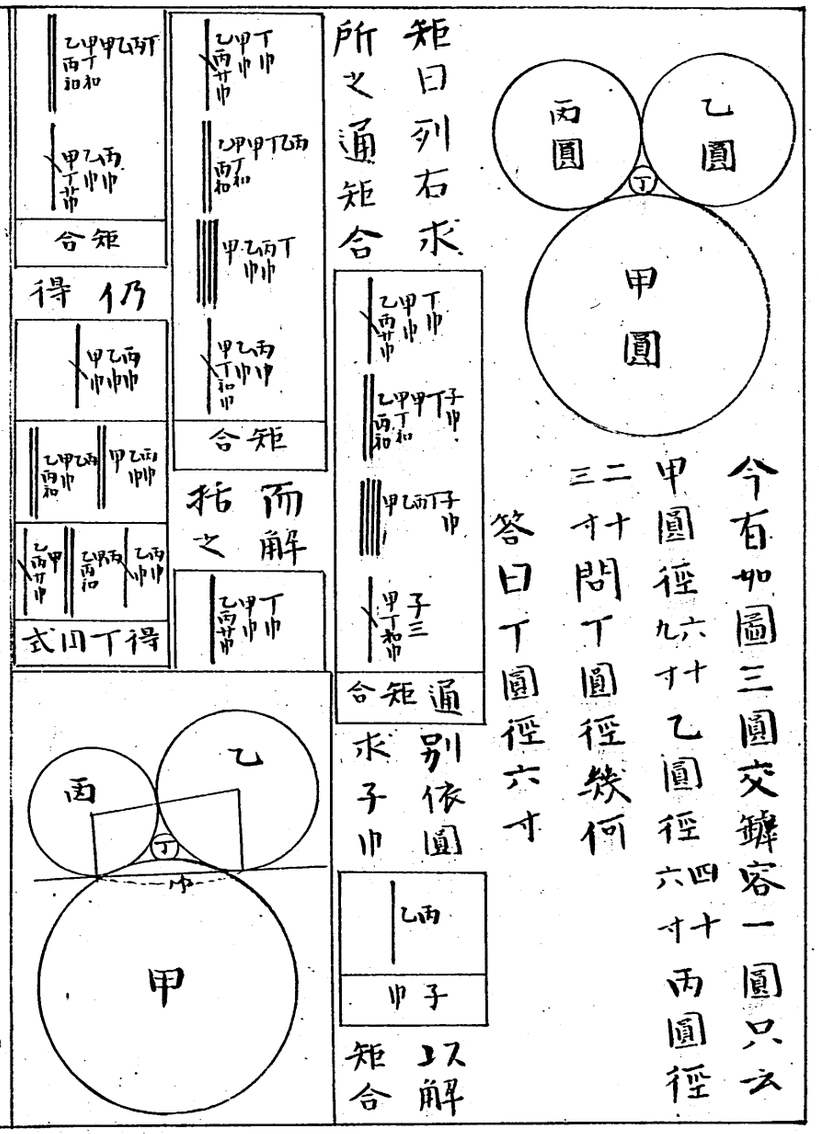
山形大学附属図書館
受
第 209708 号
昭 41.12.7
入
本館

左久間森二郎氏寄贈

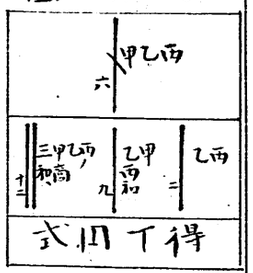


今有如圖三圓交鞈容一圓只云甲圓徑六十九寸乙圓徑四十六寸丙圓徑二十三寸問丁圓徑幾何

答曰丁圓徑六寸

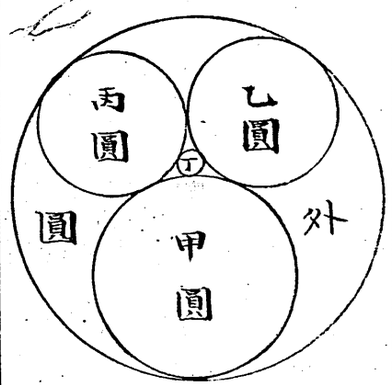


依此式求丁圓



甲圓徑三寸
乙圓徑二寸
丙圓徑一寸
丁圓徑分二十七六三
多商六寸也
乃負商六寸

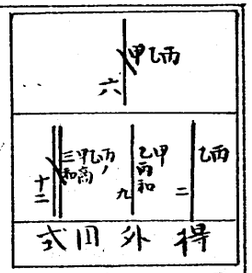
術曰甲乙丙相乘名子乘甲乙丙和開平方倍之加乙丙相乘及甲因乙丙和以除子得丁合問



今有如圖圓內容三圓又容一圓只云甲圓徑三寸乙圓徑二寸丙圓徑一寸問外圓徑幾何

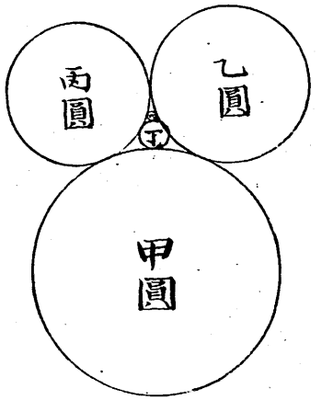
答曰外圓徑六寸

右取負商為外圓徑故如左



甲圓徑三寸
乙圓徑二寸
丙圓徑一寸
外圓徑六寸

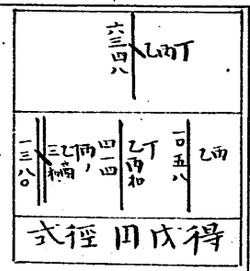
術曰乙丙和乘甲加乙因丙名天甲乙丙相乘名地乘甲乙丙和開平方倍之以減天余以除地得外徑合問



今有如圖三圓交鏈容一圓只云乙圓徑四寸丙圓徑三寸丁圓徑六寸問甲圓徑幾何

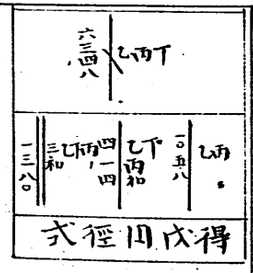
答曰甲圓徑六十九寸

矩曰推前理得甲圓徑如左



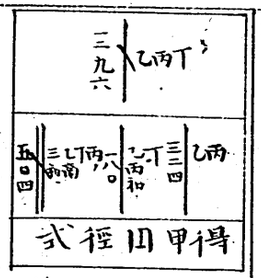
乙円至四十六
丙円至二十三
丁円至六
多正商六十九
少正商二寸三分七一
此少商者戊円径也

術曰乙丙和乘丁加乙因丙名天乙丙丁相乘名天乘乙丙丁和開平方倍之内減天余以除地得甲合問

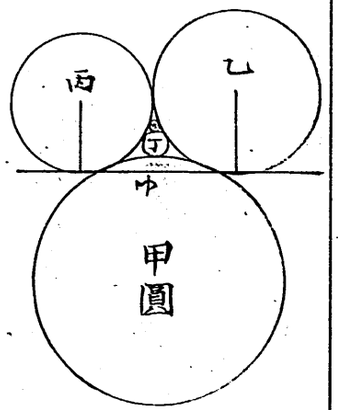


術曰乙丙丁相乘名子乘乙丙丁和開平方倍之加乙因丙及丁因乙丙和以除子得戊合問

題之員數ニ據テ反復アリ即左ニ評ス

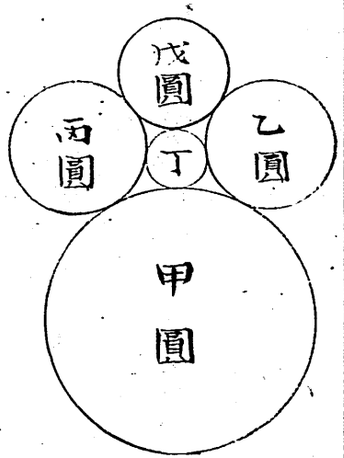


乙円至三十六
丙円至九
丁円径四
甲円径空
戊円径一寸
此題ノ員數ハ



丁円径子ノ一線ニ當ル
數ナリ故ニ甲円ヲ失ス也

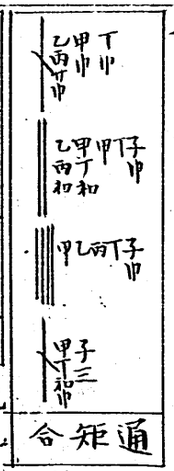
丁円子ノ一線ヨリ上ニ在ル片ハ甲円トナル
丁円子ノ一線ヨリ下ニ在ル片ハ外円トナル
丁円子ノ一線ニ當ル片ハ外円甲円共ニ失ス
丁円子ノ一線ニ當ル者モ戊円ハ即止ルナリ

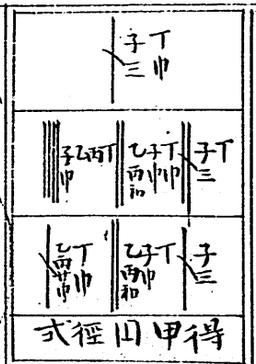


今有如圖以四圓挾一圓只云甲戊圓徑相乘若又密迫圓徑若丙圓徑若丁圓徑若問甲戊圓徑和幾何

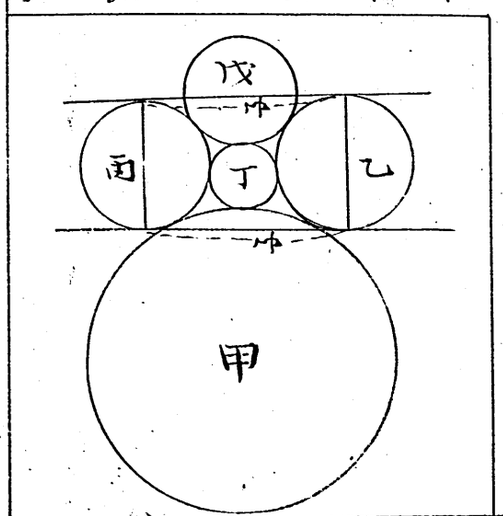
答曰

矩曰列求子巾定矩合而得甲圓徑求開方式

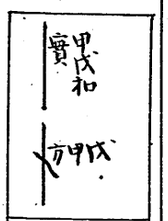




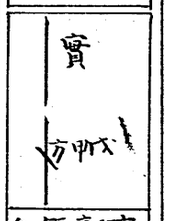
見此式實廉同名而在正商二件而乙丙二圓者換名亦同雷故甲圓乎戊圓



交商式故例得也加

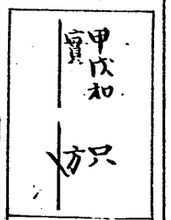


合矩商交

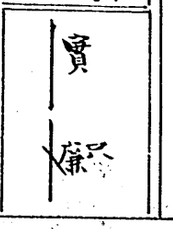


合矩商交

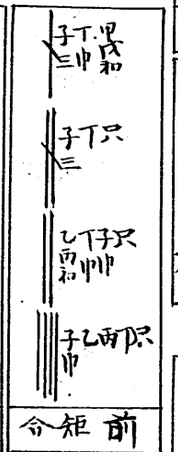
拈之



合矩前



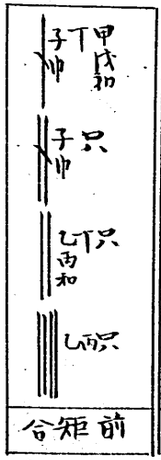
於是求二件矩合級乃數解得諸



合矩後

合矩前

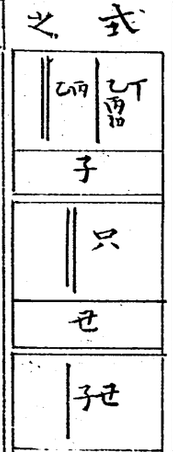
而前矩合遍省丁及子巾



合矩後

合矩前

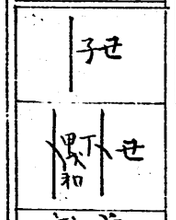
於是得子巾求丙式



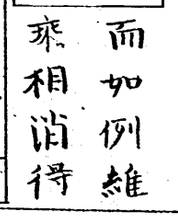
得子巾前式

拈之

子



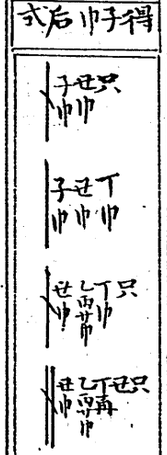
只



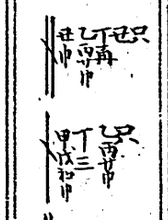
丗

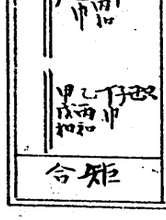
前式

而如例維乘相消得



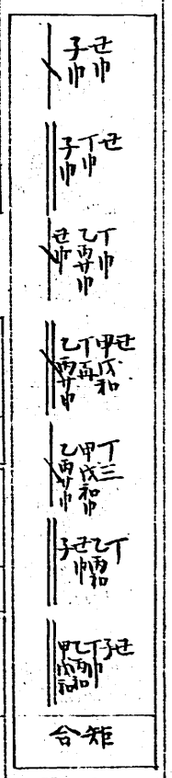
得子巾后式





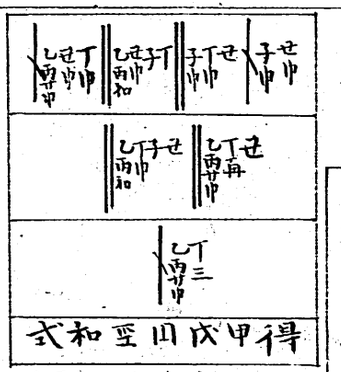
合矩

遍省只云得



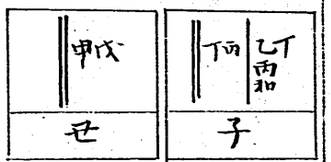
合矩

於是求得甲戊和式



得甲戊四戊和式

依此式求甲戊徑和



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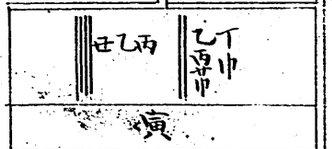

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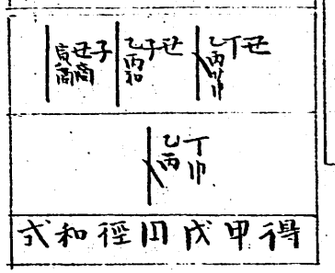
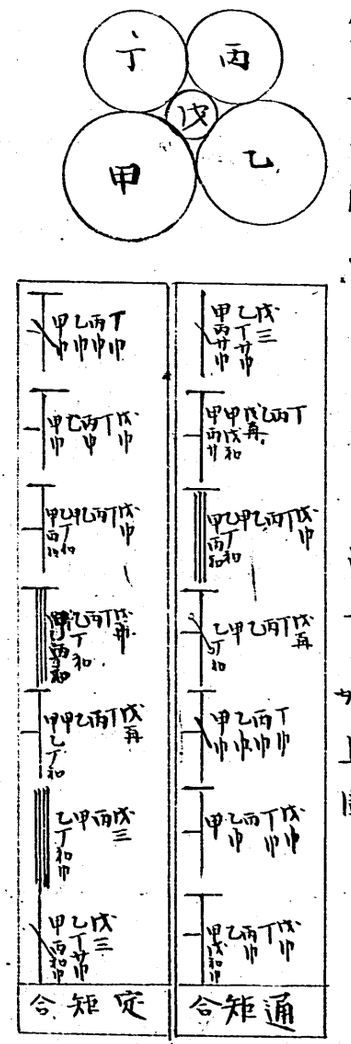
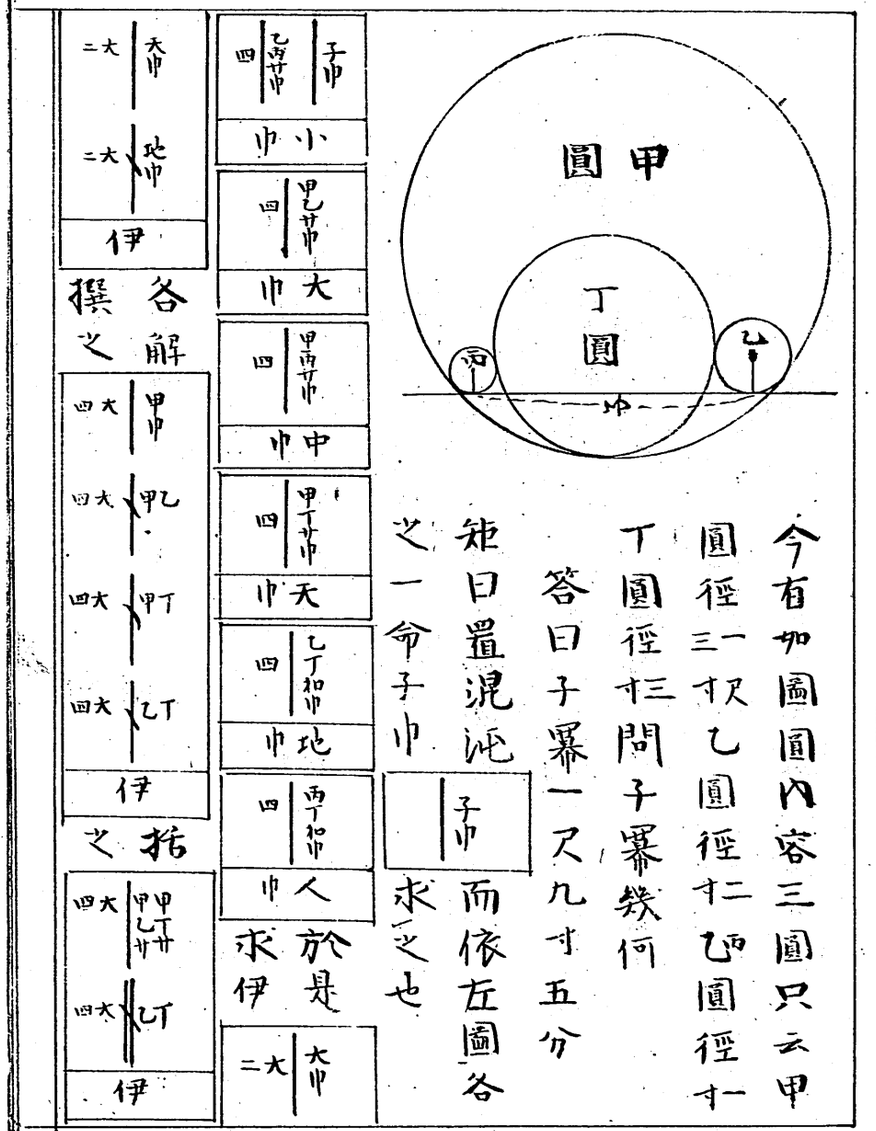


得甲戊四徑和式

術曰乙丙相乘倍之名角加丁因乙丙和名子乙丙差巾乘丁名亢乘丁名氐加角乘只云開平方加只云因乙丙和乘子內減只云因亢余倍之以氐除之得甲戊和合問

右定矩合解括之求五圓之通矩合乃圓名加上圖





今有如圖圓內容三圓只云甲圓徑一尺乙圓徑十二丙圓徑十一丁圓徑十三問子冪幾何

答曰子冪一尺九寸五分

矩曰置混沌子巾而依左圖各求一之也

求伊於是

求呂

撰解

呂之括

呂

求波

撰解

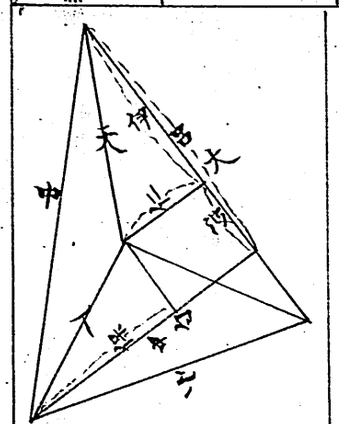
波之括

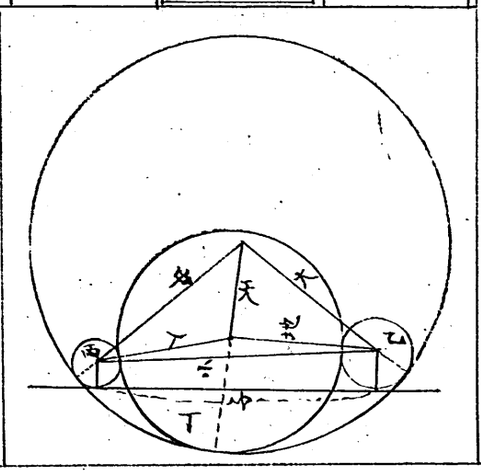
波

而求仁巾

解巾之來六十得除

仁巾





大除巾六十

撰之括

仁巾

撰之括

仁巾

求中巾鈎

中巾夕

各解之來除大巾六十

撰之括

中巾夕

撰之括

又求保巾

各解之來

保巾

撰之括

保巾

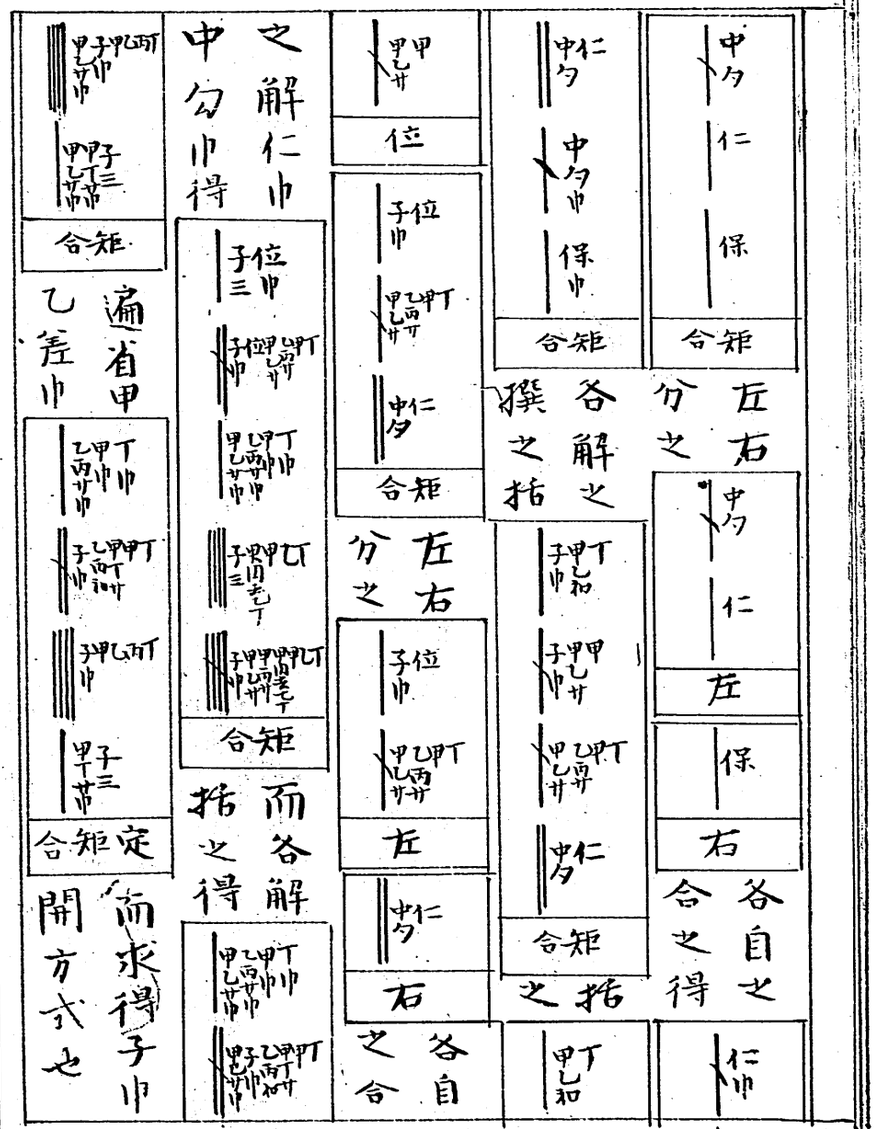
仁巾

中巾夕

於是仁巾保巾中鈎巾之三象

遍省除象大巾四段而命同名

於是求矩合七



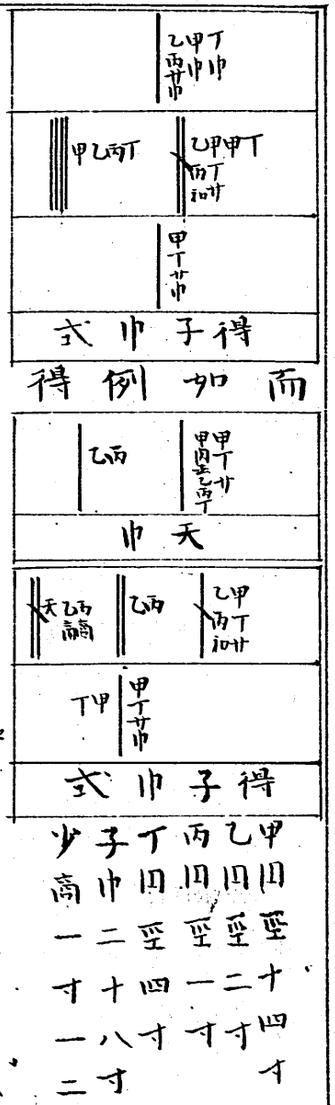
術曰乙丙徑相乘名子甲丁徑差名壬乘乙丙徑和名寅加子及壬巾乘子開平方內減子余倍之加寅乘甲及可徑以壬巾除之得子冪合問

甲圓徑一十一寸　乙圓徑五寸　丁圓徑三寸

甲圓徑一十三寸　乙圓徑五寸　丁圓徑四寸

丙圓徑一寸　子巾三十五寸　少商四寸一二五

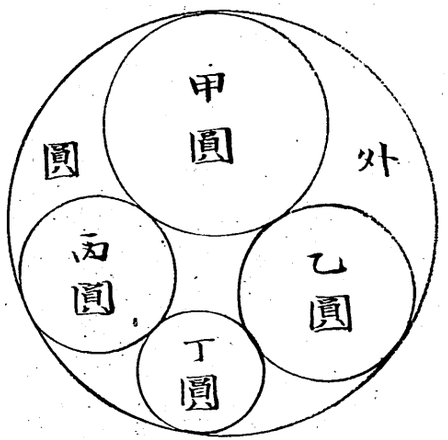
丙圓徑三寸　子巾六十五寸一二十七　少商

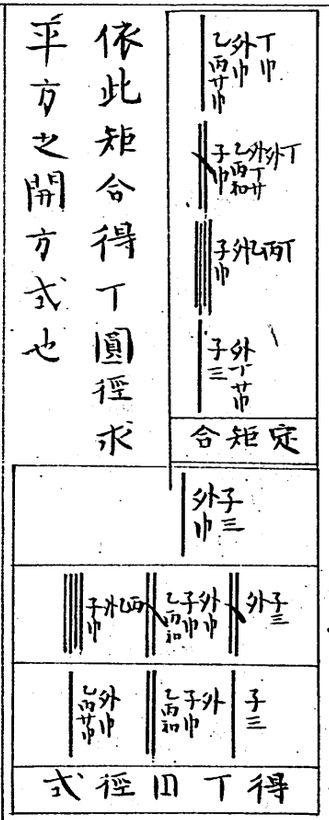


今有如圖圓內容四圓只云外圓徑若乙圓徑若丙圓徑若丁圓徑若問甲圓徑幾何

答曰

矩曰右所求之列定矩合而以外圓換甲圓名定矩合





依此矩合得丁圓徑求平方之開方式也

見此式實廉同名而有正商二仟此則得丁圓與甲圓交商式

也故求交
商矩合也

前矩合

後矩合

故求前後兩矩合乃
前矩合者遍省過來

於是求得
子巾兩式

前矩合

後矩合

得子巾式前

得子巾式后

於是如
例維來

相消

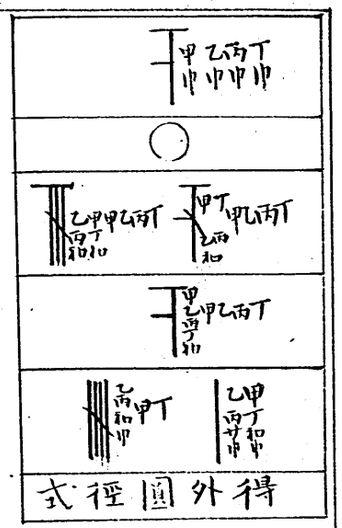
而撰

合矩

遍省甲丁解
括之求定矩合

定矩合

假列得
外圓式

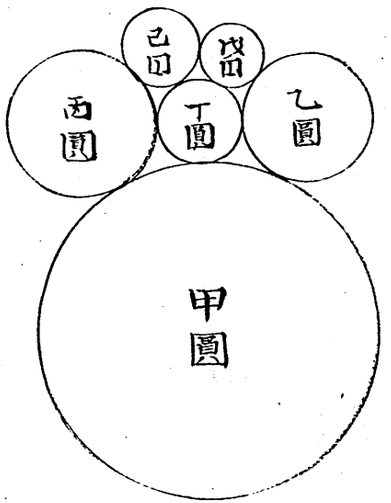


得外圓徑式

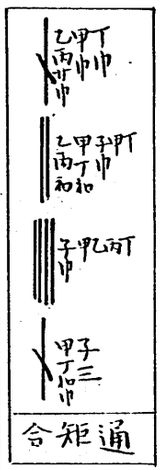
今有如圖以五圓狹一圓只云乙圓徑捿丙圓徑捿丁圓徑捿戊圓徑捿己圓徑捿問甲圓徑幾何

答曰

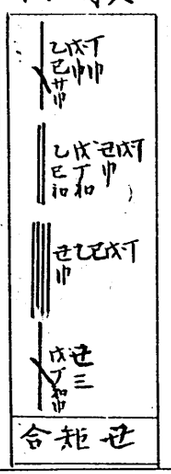
矩曰列用甲乙丙丁得子丑



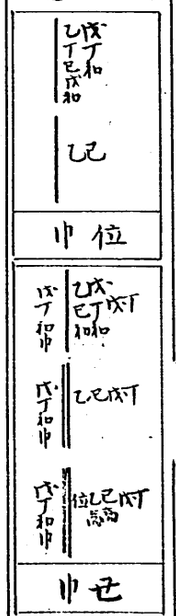
通矩合也



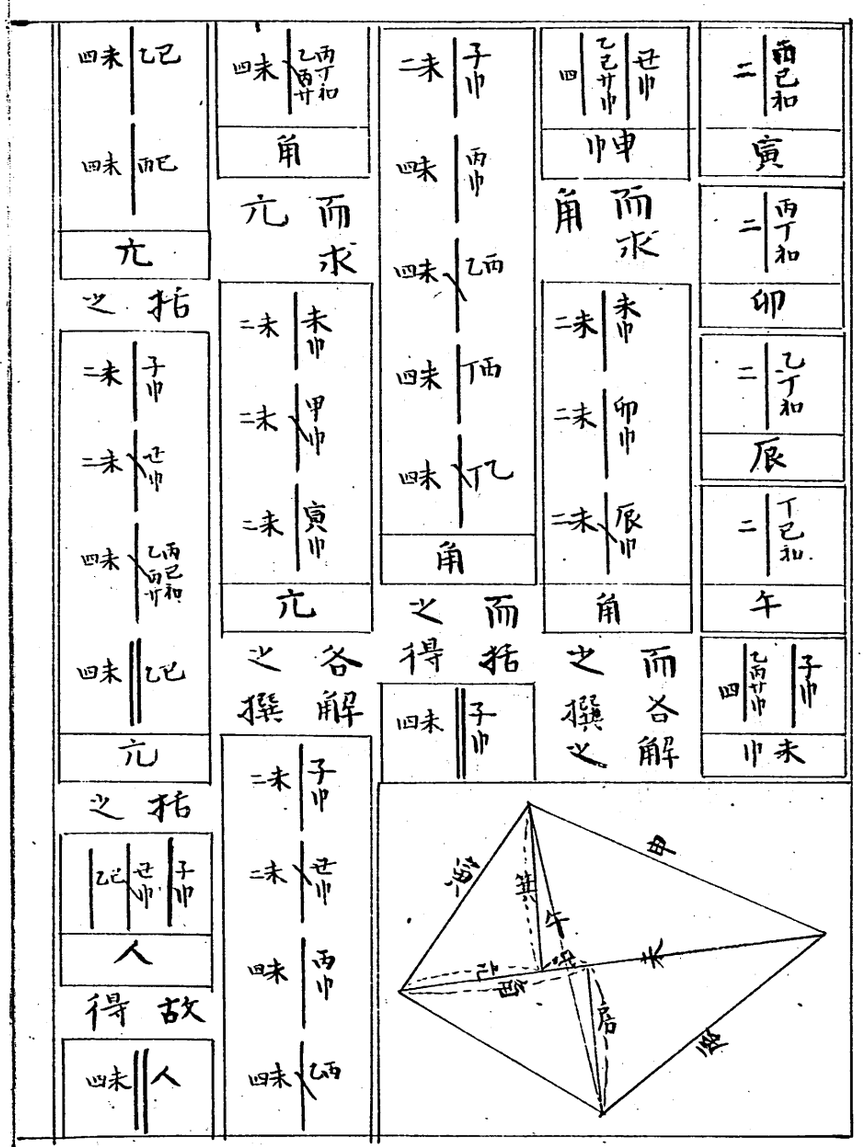
而換名得

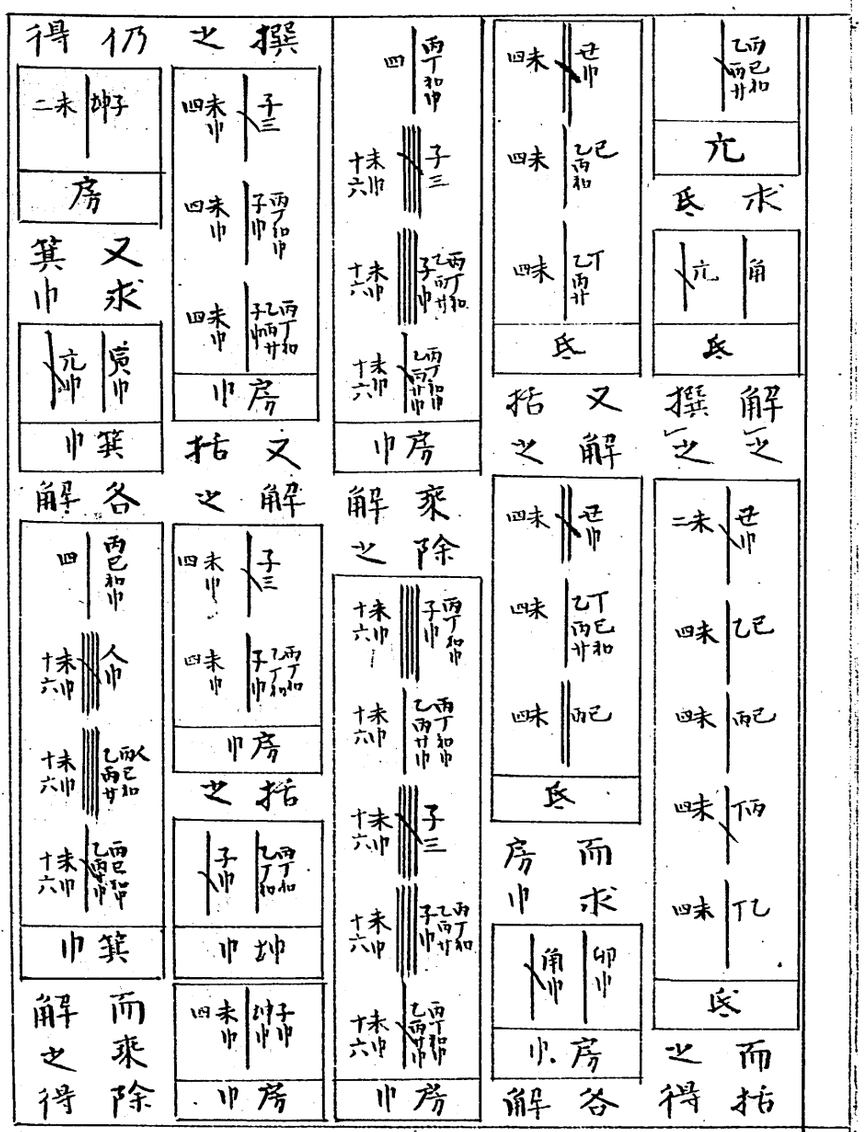


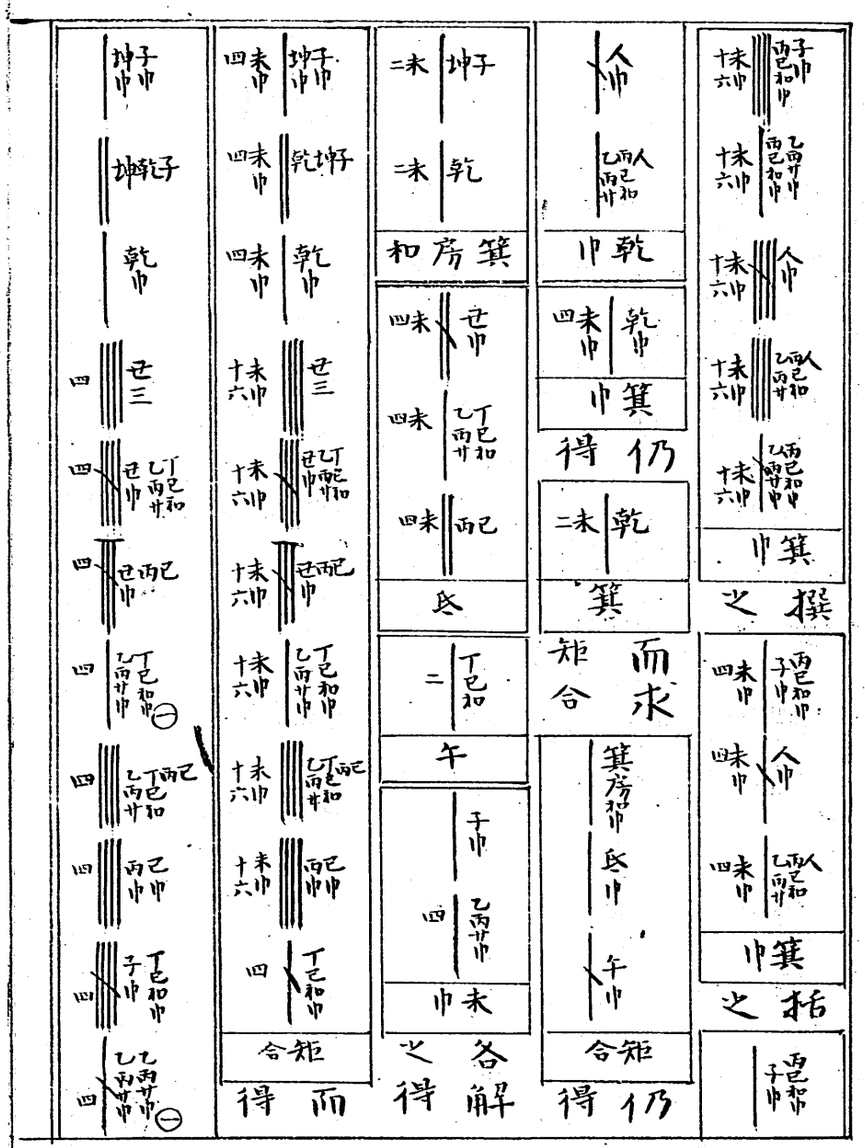
依此矩合求丑巾也

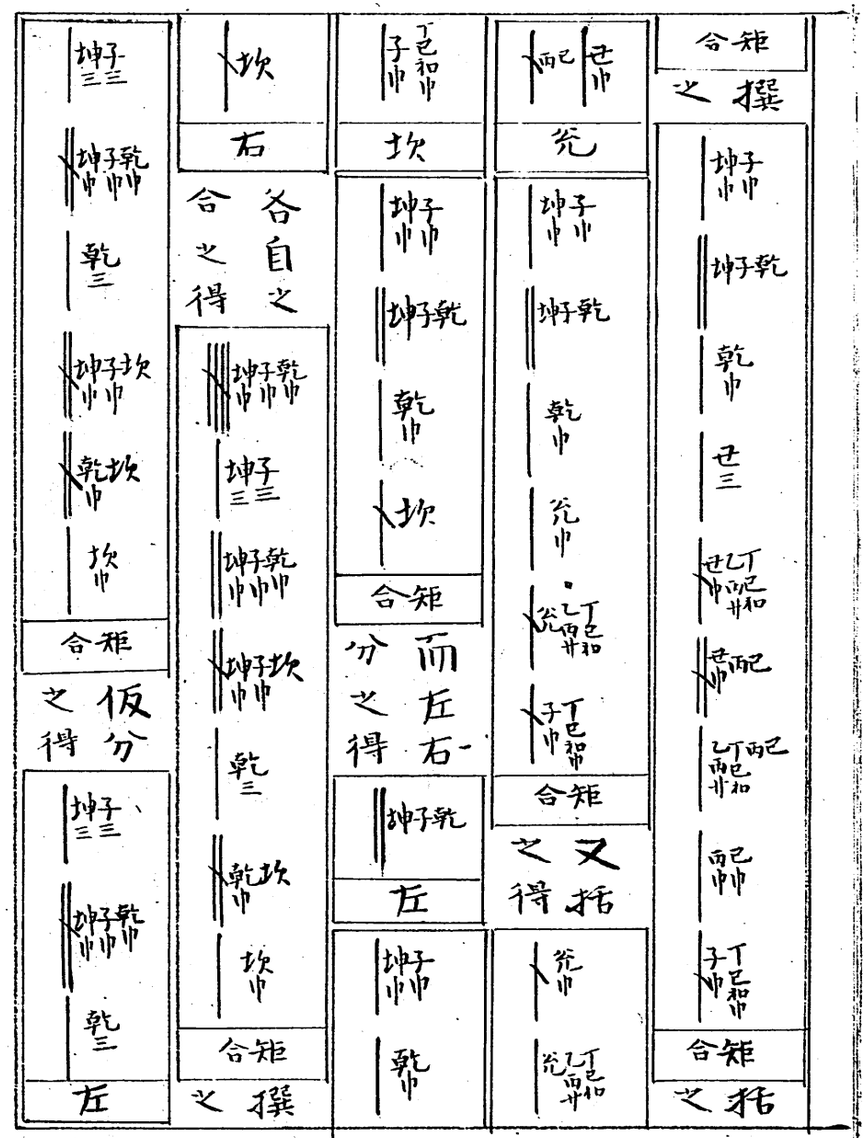


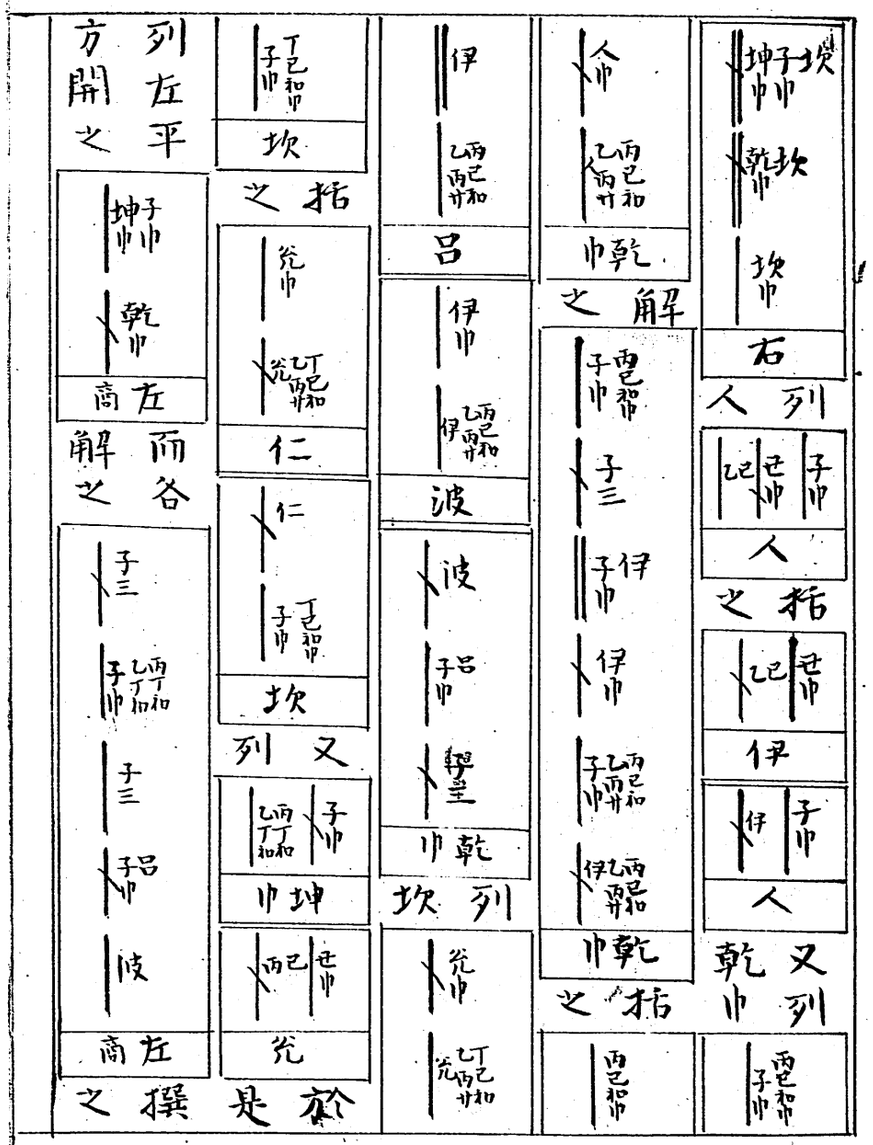
於是依次圖各求之也

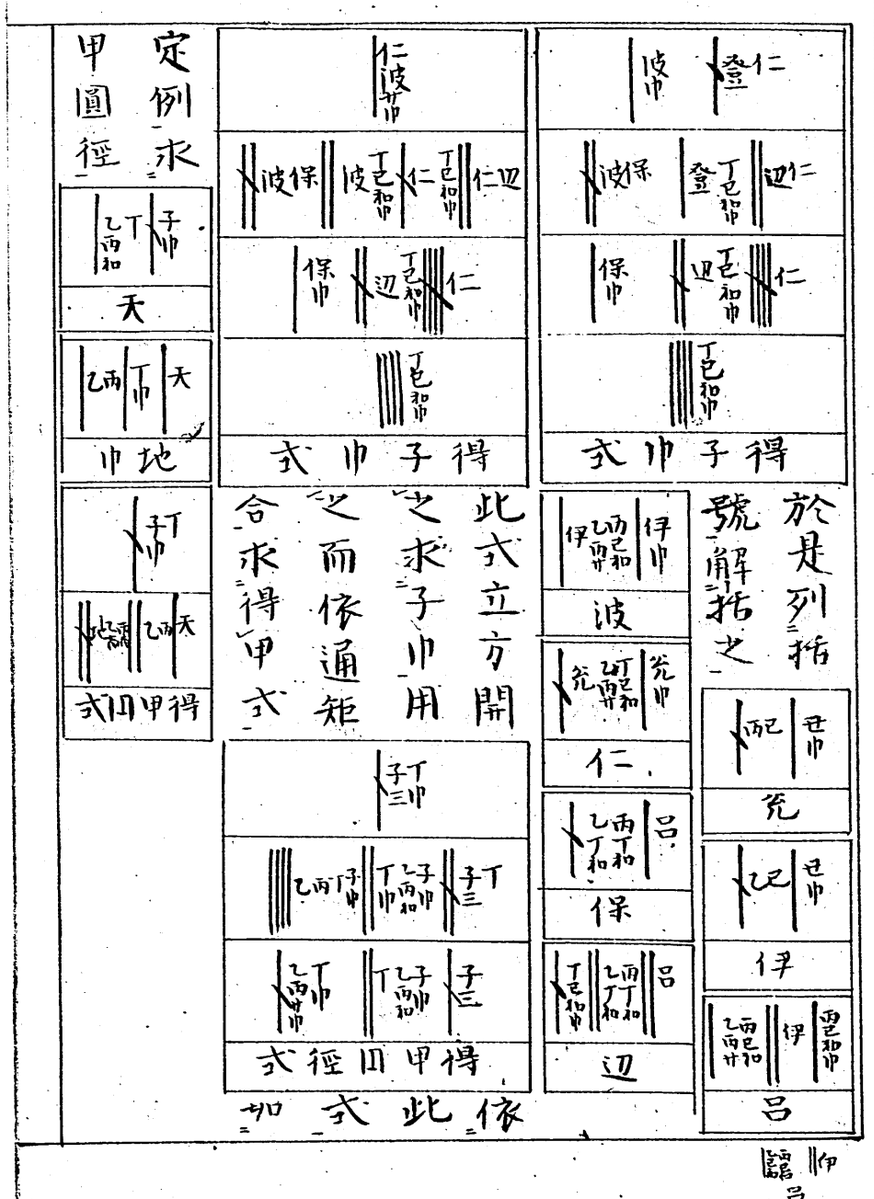

寅
卯
辰
午
巳
申
角
而求
角
而求
角
而求

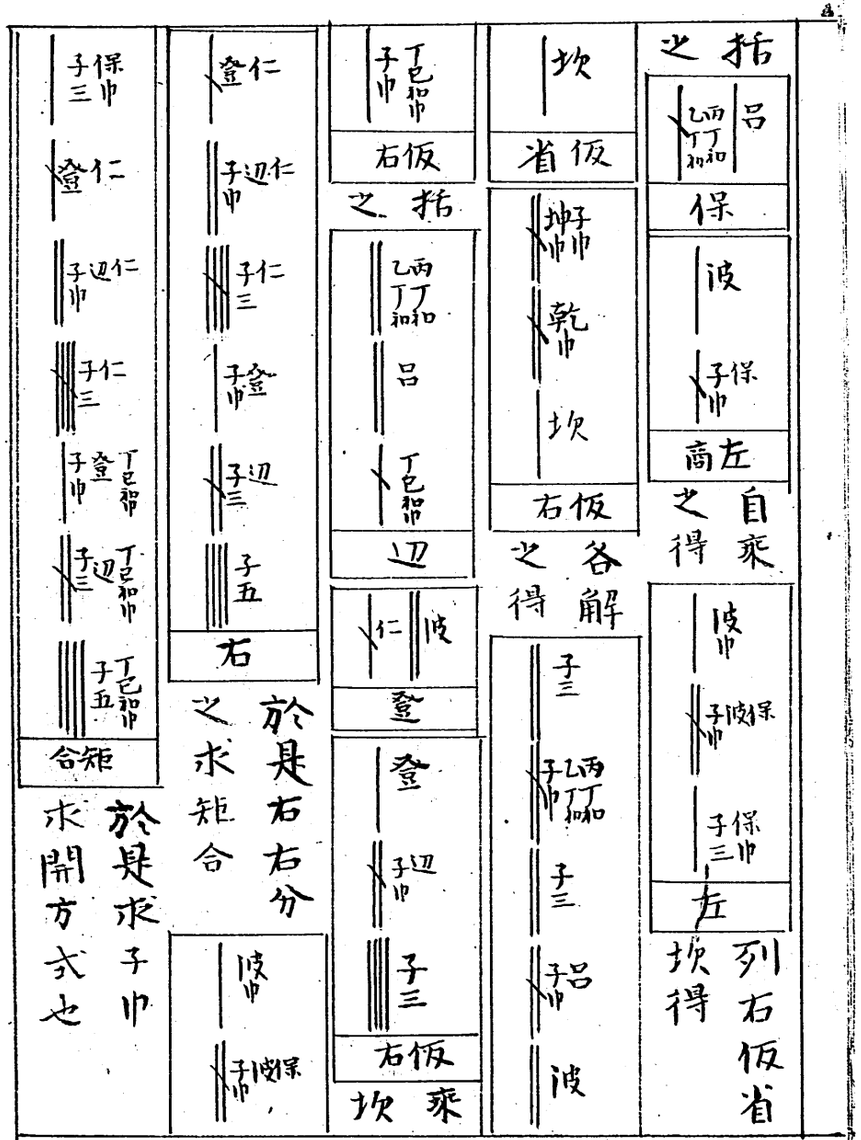

得仍之撰
求兌
解之撰
之解括又
之解括又
解來除之
解各括又
解而求房巾
解各房巾
解而除之得
解而括之得


之撰
之括
得仍之
求而矩合
得仍
得而
之解各得
得而矩合


合矩之撰
合矩之括
兌
坎
右
合矩
左
合矩之撰
合矩
左
合矩
右
坎
兌
合矩
坎
合矩
各自之得
而左右得
又得括
仮分之得


坎
右
人列
人
之括
伊
人
乾列
乾
之解
乾
之括
呂
波
坎列
坎
之括
仁
坎
列又
坤
兌
於是
列左平
開方之
商左
解而各
商左
之撰


定例求甲圓徑
天
地
式四甲得
式巾子得
式巾子得
此式立方開之求子巾用之而依通矩合求得甲式
式四甲徑得
加式此依
於是列括號解括之
於是求子巾
波
仁
呂
保
辺
伊
兌
呂


合矩
右
右仮
之括
辺
登
右仮
坎乘
於是右右分之求矩合
於是求子巾求開方式也
右仮省
坎
右仮
各解之得
波
左
保
商左
自乘之得
列右仮省坎得
之括

術曰乙巳相乘名子戊丁和名丑乘乙巳和名寅加子及丑巾乘子開平方加子倍之加寅乘丁及戊以丑巾除之名卯解中丑巾內減子名伊倍之加乙巳和因丙巳和名呂內減乙丁和因丙丁和名保丁巳和巾名酉呂四段內減酉及保二段名辺乙丙差乘丙巳和名辰加伊乘伊名波丙巳相乘以減卯名充內減辰乘充名仁波仁差巾為實正辺二段內減酉乘仁名午酉內減保余乘波倍之加午為方正酉乘辺加仁二段倍之內減保巾為廉負酉四段為偶正而立方開之名甲解中子巾以減丁因乙丙和名天乙丙相乘名未加天及丁巾乘未開平方倍之以減天與未二段和余以除丁

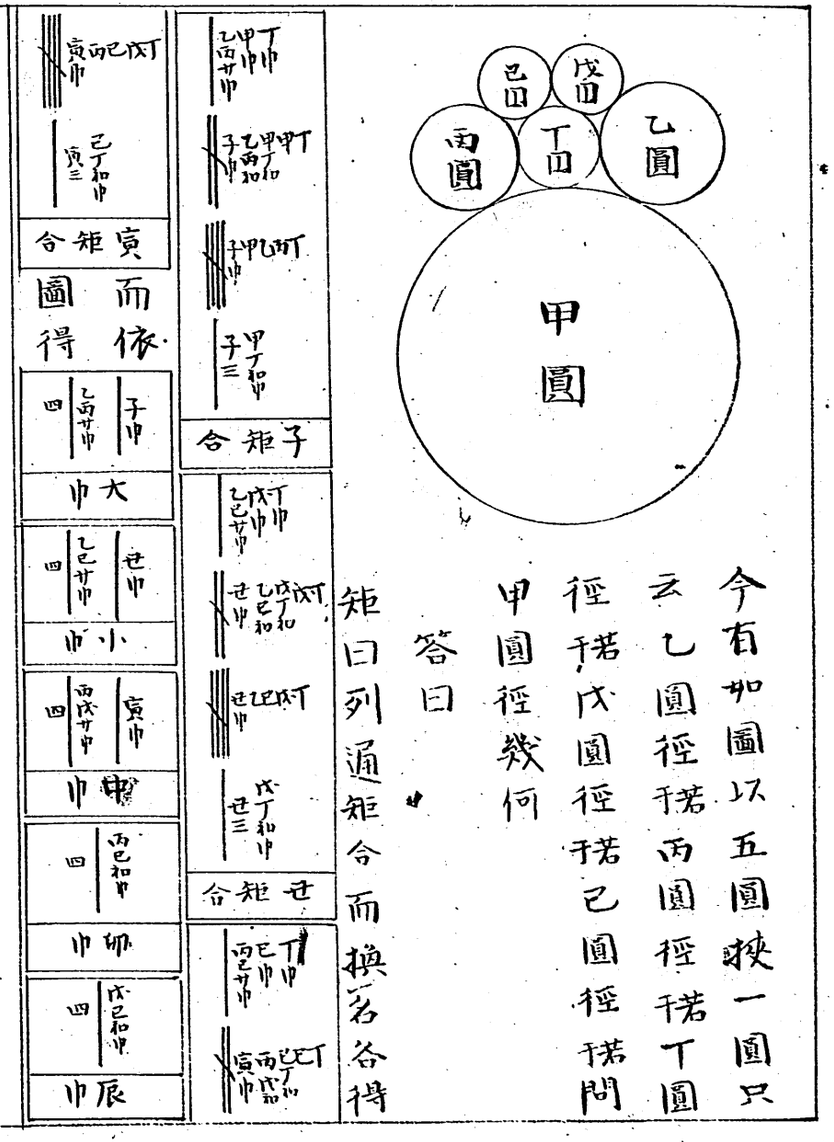
因巾得圓徑合問

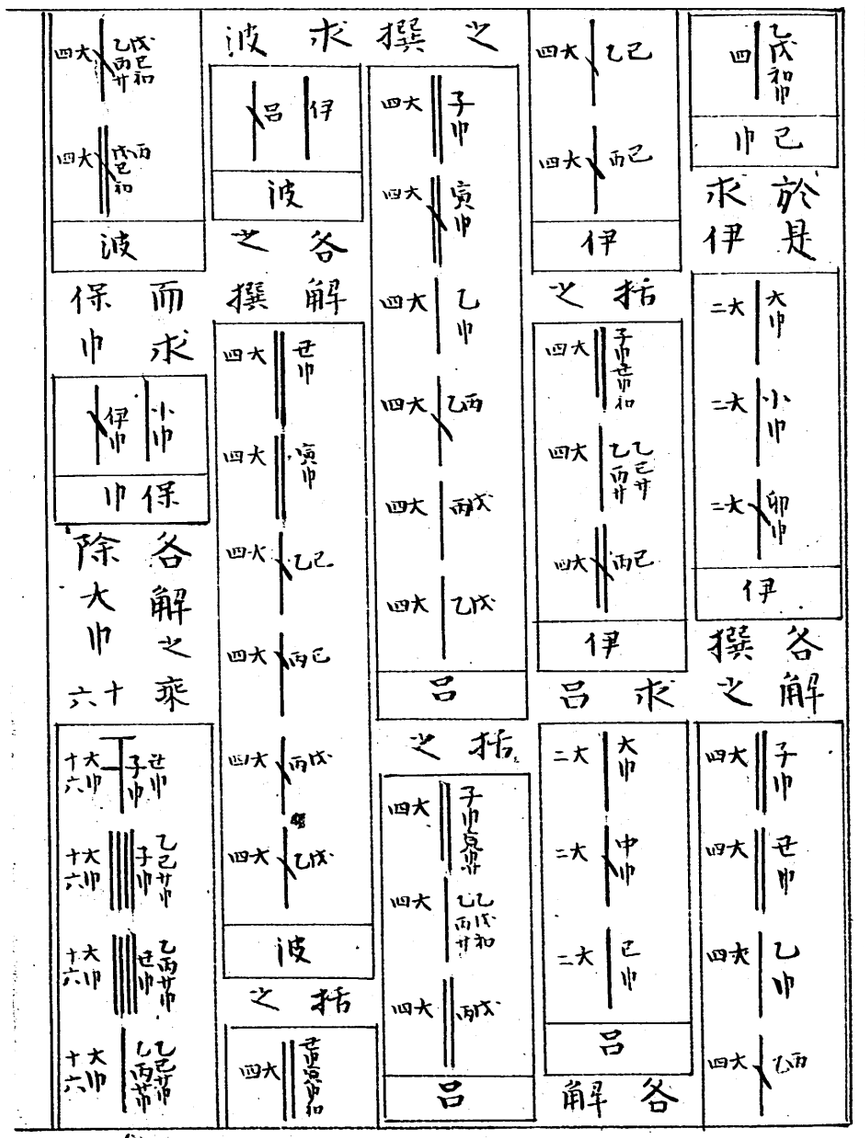
評曰此術ヲ見レハ初メニ開平方ヲ用ヘテ丑巾ヲ求メ而シテ是ヲ用ヘテ立方ノ開方式ヲ設ケ開之子巾ヲ求メ又是ヲ用ヘ開平方ヲ用ヘテ甲圓徑ヲ得ルナリ按スルニ此術中立方ノ開方式ヲ得ルモノハ過乘アルベシ然レトモ此解中容易ニ省クヿ能ハズ故ニ又次ニ一條ノ術路ヲ設テ其術ヲ試ム

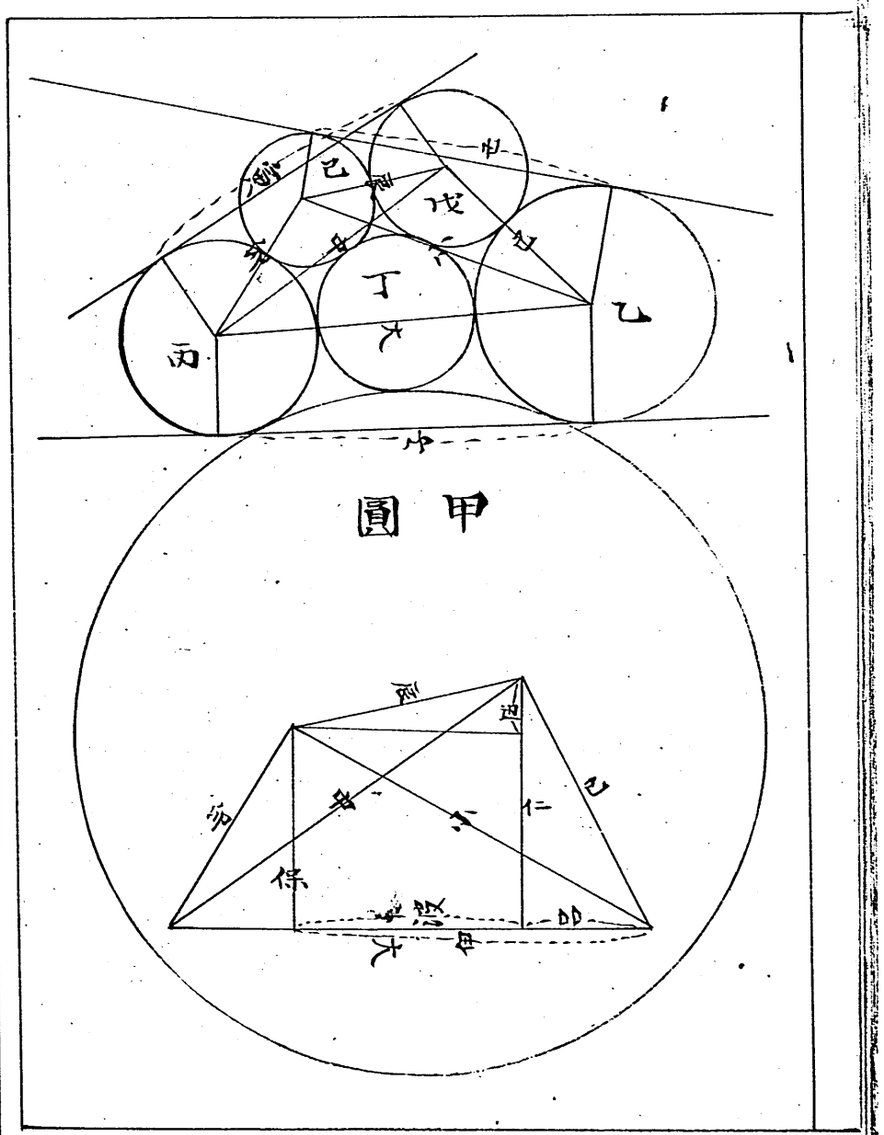
今有如圖以五圓挾一圓只云乙圓徑若干丙圓徑若干丁圓徑若干戊圓徑若干己圓徑若干問甲圓徑幾何

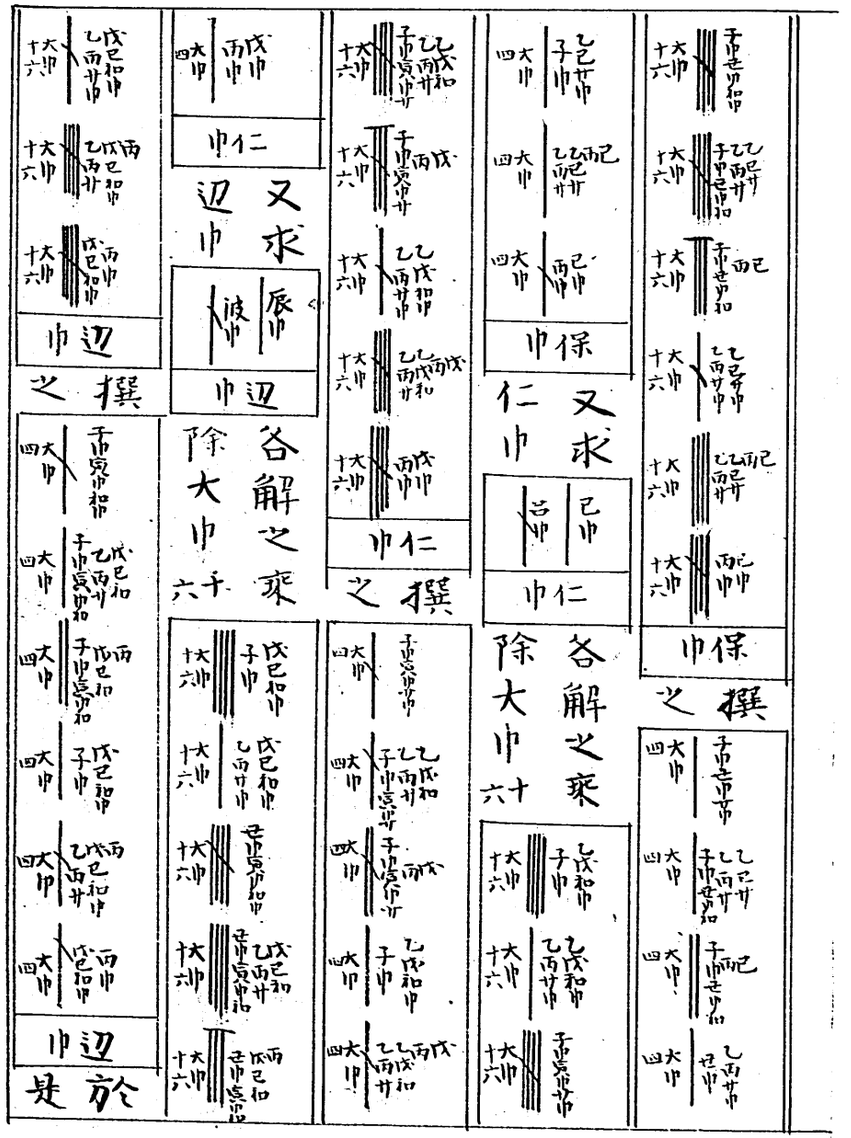
答曰

矩曰列通矩合而換名各得

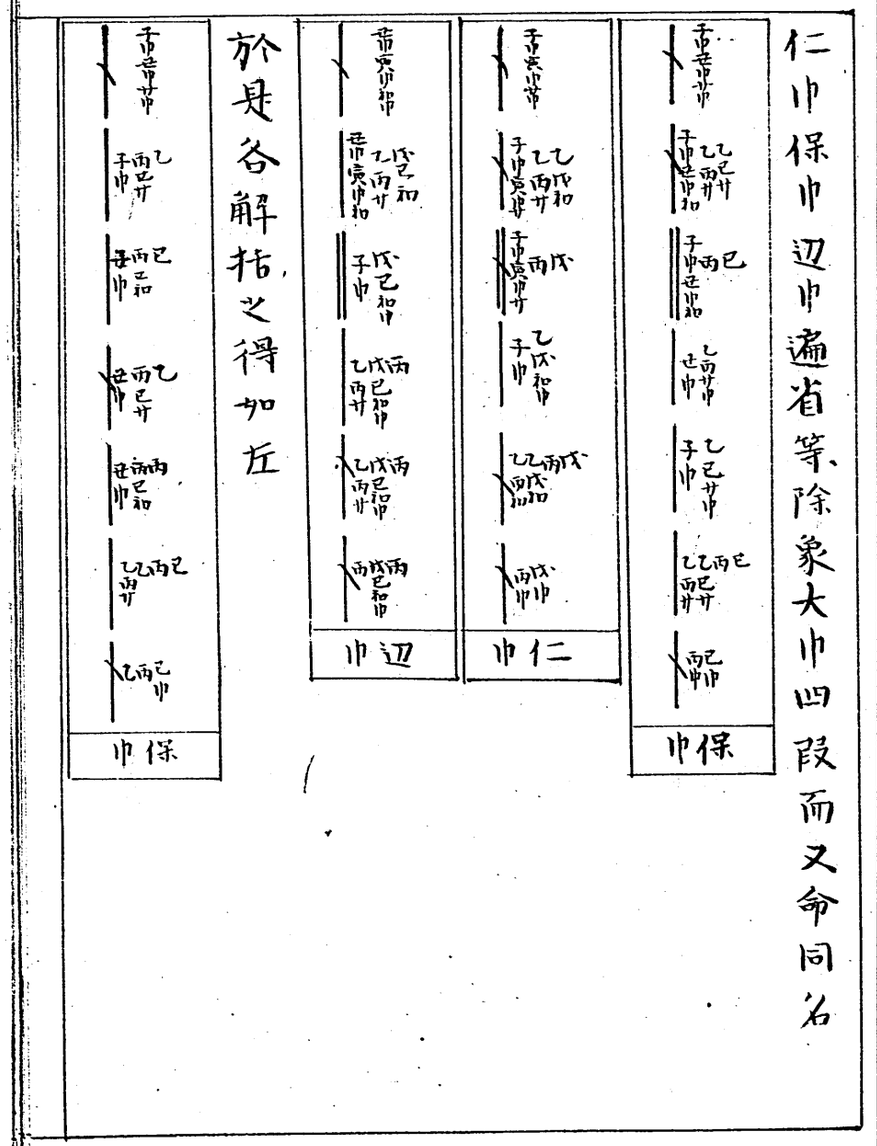


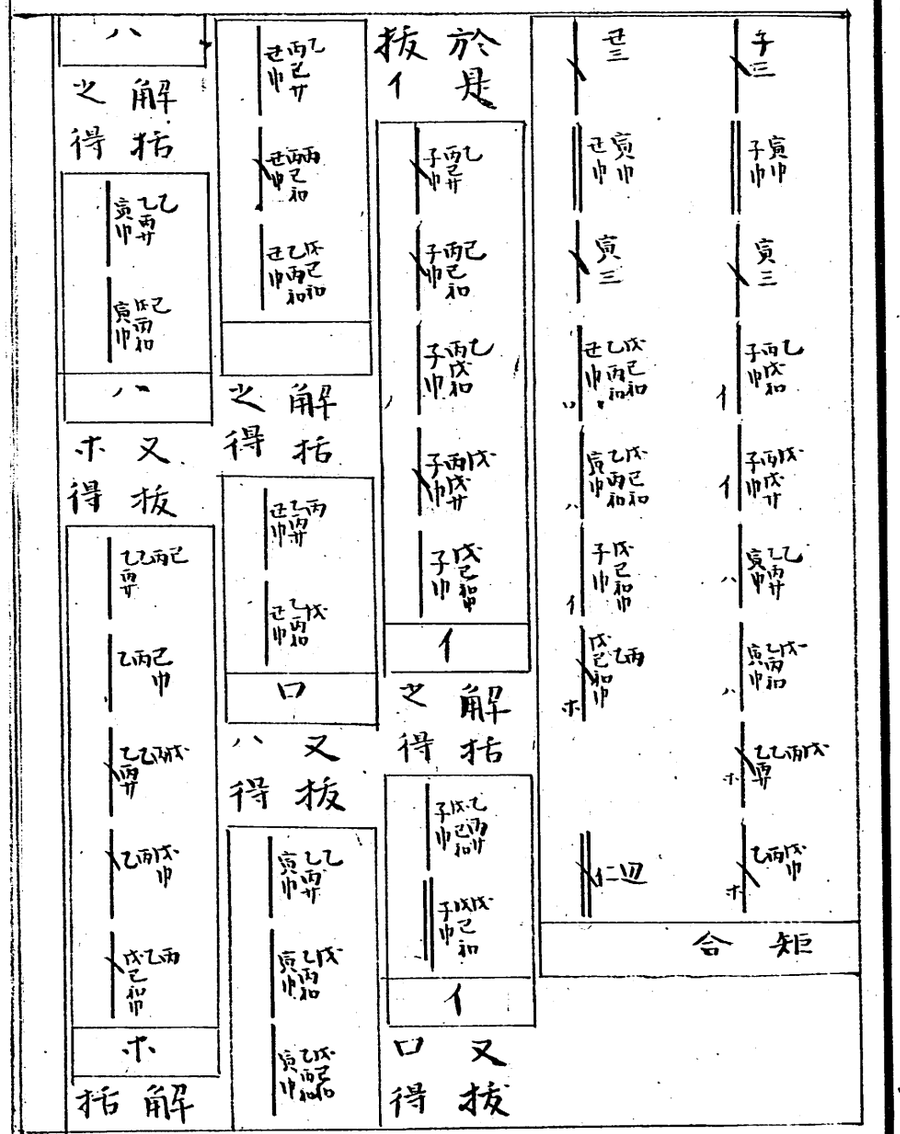

求撰之波
四大 乙戊 己丙 廿
四大 戊丙 己和
波
呂 伊
波
之各解撰
四大 子巾
四大 寅巾
四大 乙巾
四大 乙丙
四大 丙戊
四大 乙戊
呂
四大 乙己
四大 丙己
伊
四大 子巾 丑巾 和
四大 乙乙 丙廿
四大 丙己
伊
四 乙戊 和巾
巾己
於是求伊
二大 大巾
二大 小巾
二大 卯巾
伊
而求保巾
伊巾 小巾
巾保
除各大巾解之乘六十
十六大巾 子巾 丑巾
十六大巾 乙己 子巾 廿
十六大巾 乙丙 丑巾 廿
十六大巾 乙己 丙廿 廿
四大 丑巾
四大 寅巾
四大 乙己
四大 丙己
四大 丙戊
四大 乙戊
波
之括
四大 丑巾 寅巾 和
四大 子巾 寅巾
四大 乙乙 丙廿 和
四大 丙戊
呂
之括
呂求
二大 大巾
二大 中巾
二大 己巾
呂
各解
四大 子巾
四大 丑巾
四大 乙巾
四大 乙丙
各撰之解

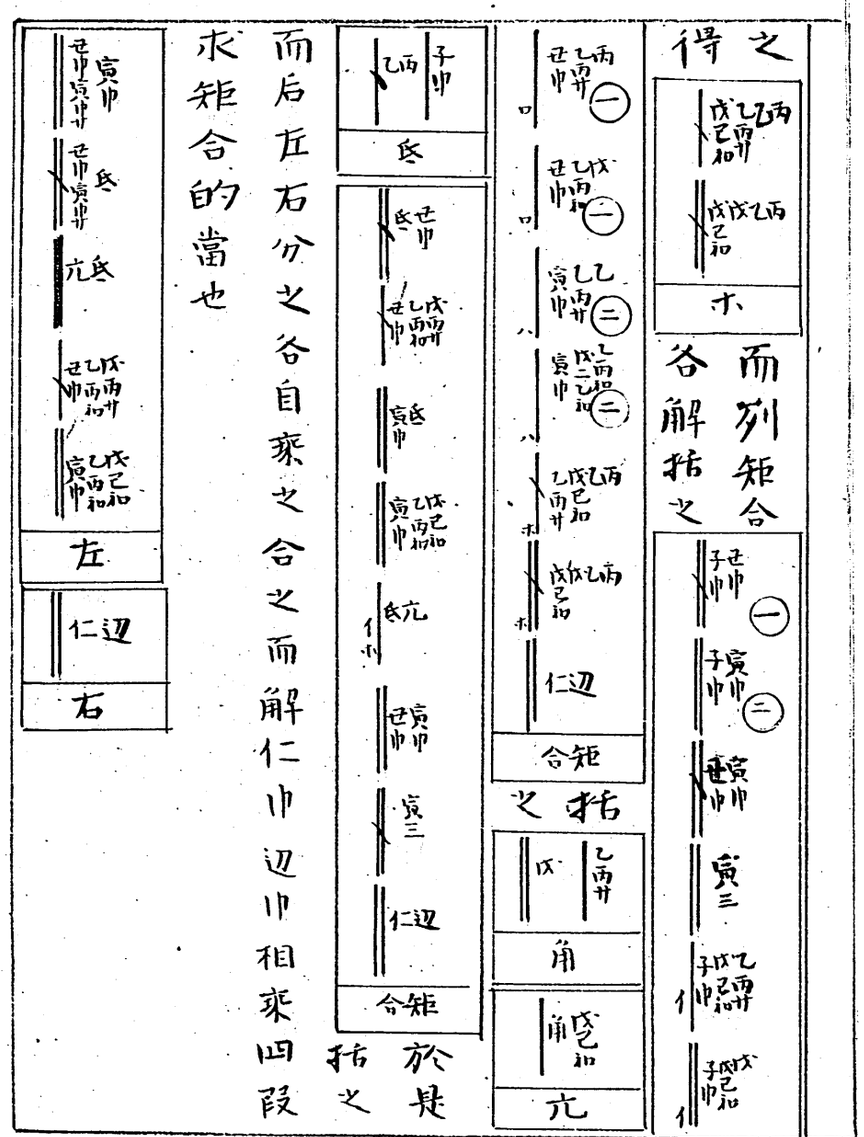

己
戊
丙
丁
乙
巾
圓甲
保
仁
己

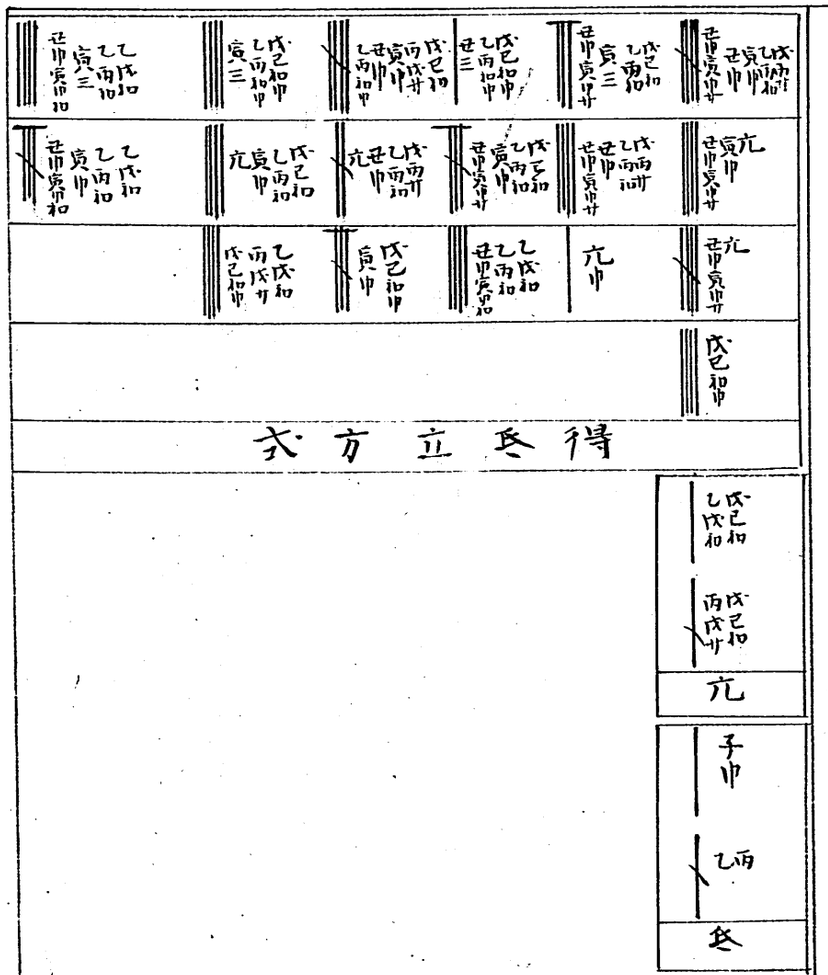


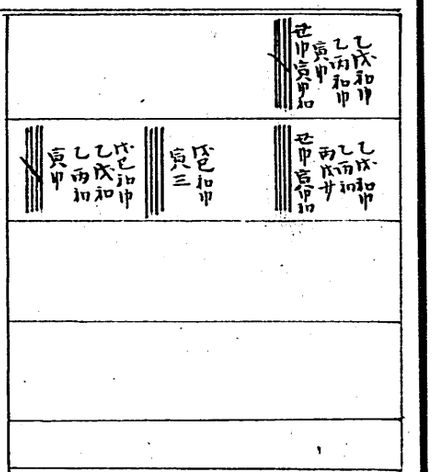
仁巾保巾辺巾遍省等除象大巾四段而又命同名




子三
寅巾
子巾
寅三
子巾
子巾
子巾

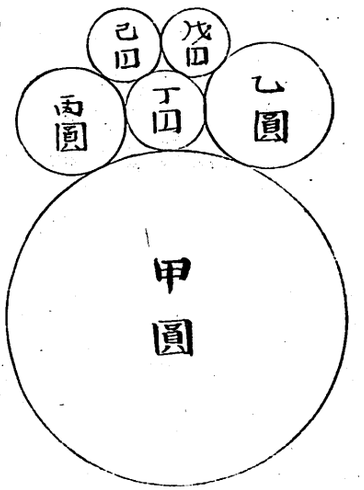

而列矩合
得之
各解括之
矩合之括
矩合
於是括之
而后左右分之各自乘之合之而解仁巾辺巾相乘四段
求矩合的當也
左
右
仁辺
左巾
右巾





評曰此術ヲ見レハ子巾ヲ得ルモノハ立方式ナリ乃右式ハ長ヲ得ル式ナリ然レトモ子巾ヲ得ル式モ亦立方式トナルナリ按スルニ二件ノ立方式ヲ用ヘテ簡易ノ術ヲ得ルノ業アリ然レトモ其術混雜ナリ伏按スルニ六圓ヲ以テ一圓ヲ圍ノ通術ニ據ルトキハ此條ノ

答術モ筭顆術ヲ得ルナリ故ニ次ニ其術ヲ載ス

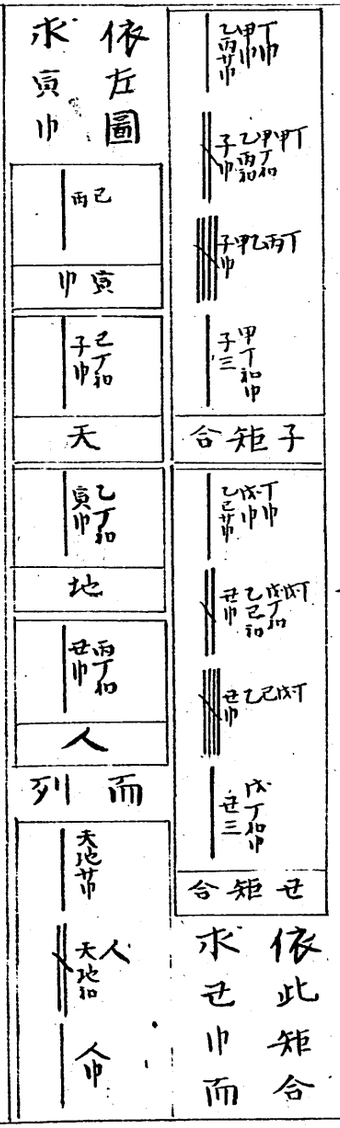


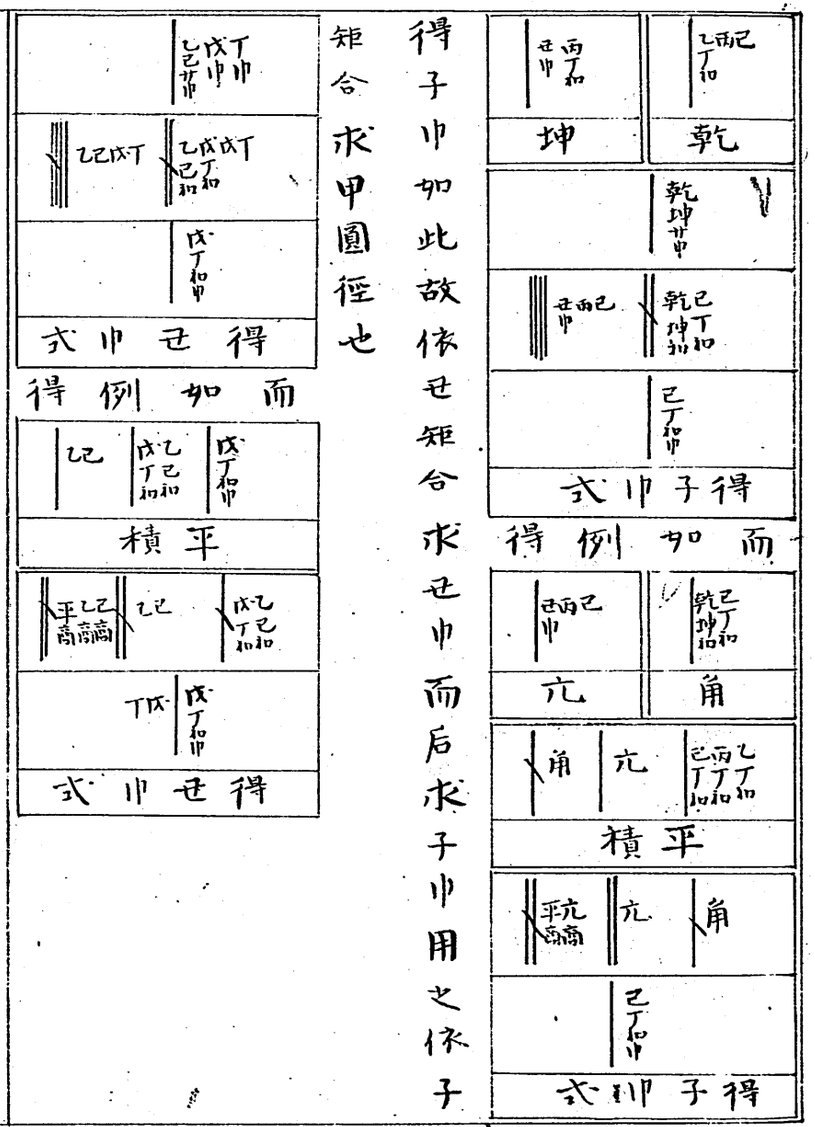
今有如圖以五圓圍一圓只云乙圓徑捿丙圓徑捿丁圓徑捿戊圓徑捿己圓徑捿問甲圓徑幾何

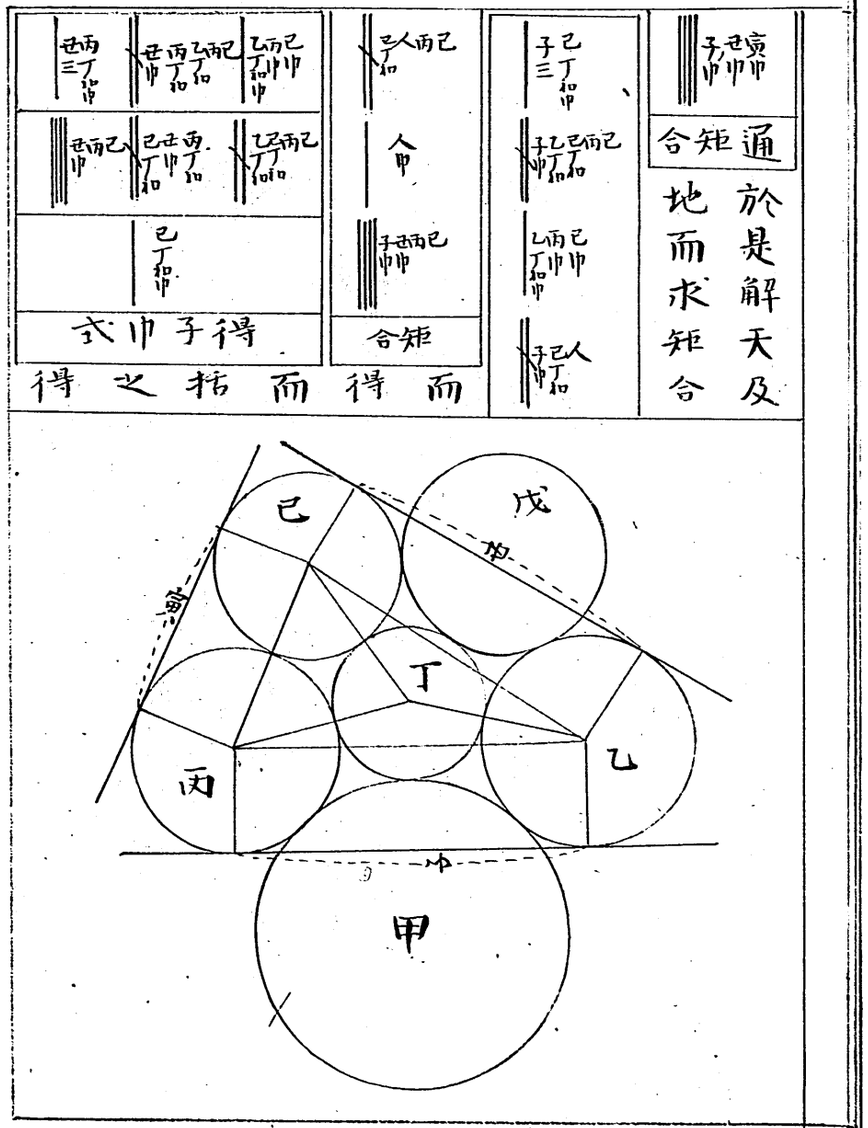
答曰

矩曰列前所求之通矩合

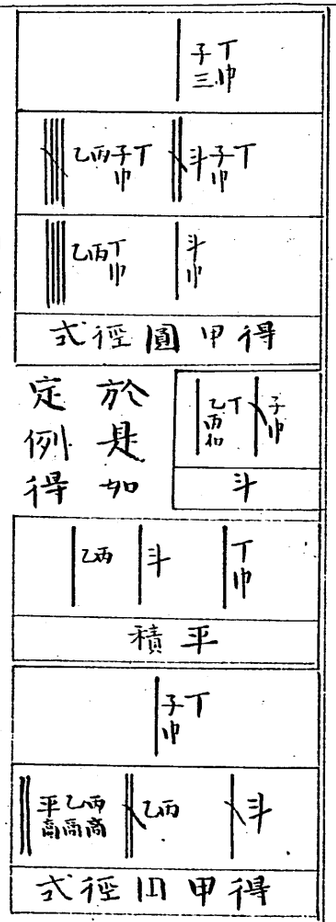
依此矩合求壬巾而




得子巾如此故依丑矩合求丑巾而后求子巾用之依子矩合求甲圓徑也
坤
乾
式巾子得
而如例得
亢
角
平積
式巾子得
而如例得
式巾丑得
平積
式巾丑得


式巾子得
合矩
式巾子得
而得之括而得
通合矩
於是解天及地而求矩合
甲
乙
丙
丁
戊
己

術曰乙己圓徑二字畧之相乘名角戊丁和名亢乘乙己和名氐加角及亢巾乘角開平方加角倍之加氐乘丁及戊以角巾除之名天巾乘丙丁和名觜巾乘乙丙及己也乾加房乘丁己和名心也角天丙己相乘名尾也亢己丁和巾乘丙丁和及乙丁和加尾內減心乘尾開平方倍之加心內減尾二段余以丁己和巾除之名地巾以減丁因乙丙和名斗

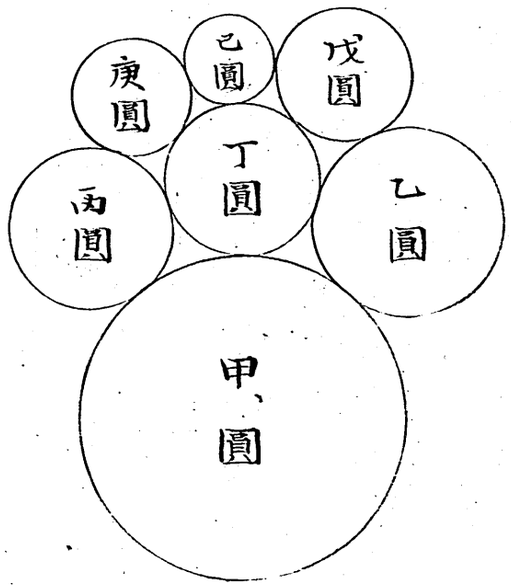


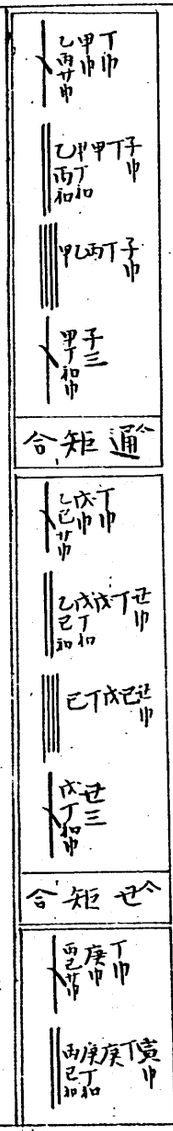
乙丙相乘名午加斗及丁巾乘午開平方倍之以減斗與午二段和余以除丁因地得甲圓徑合問

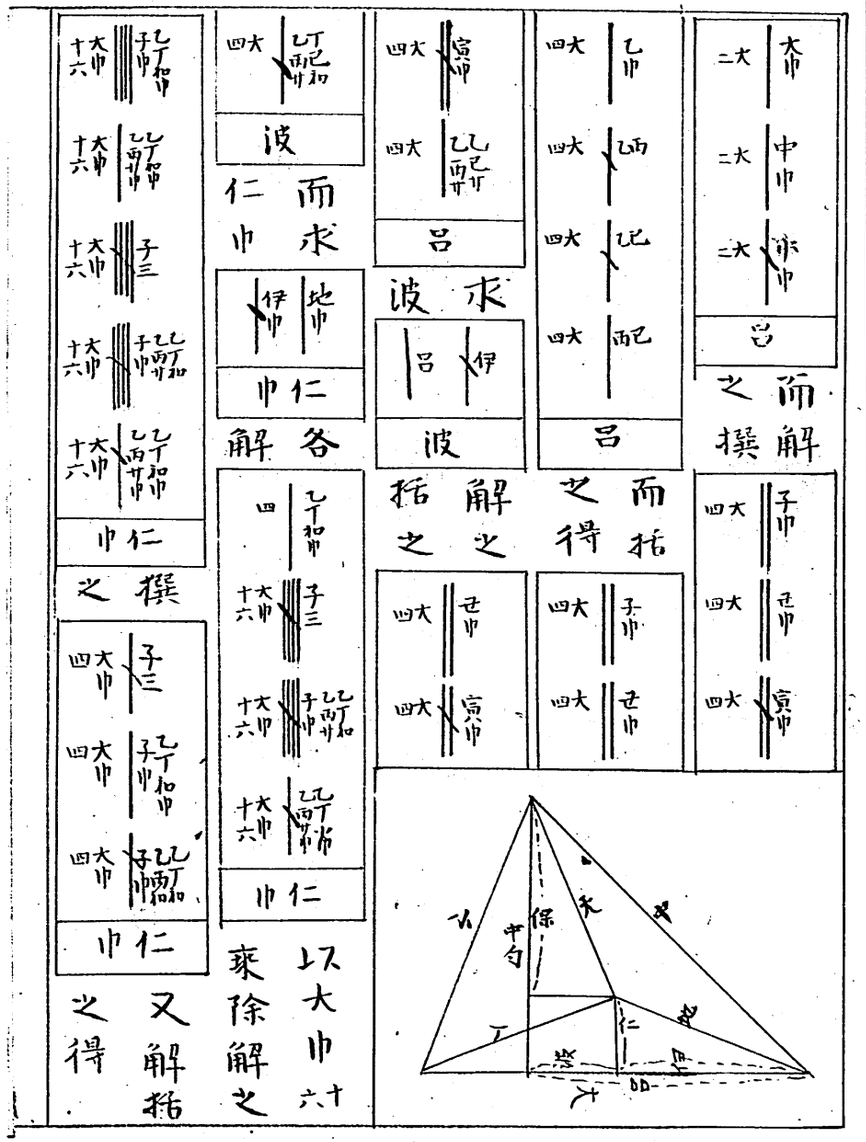
今有如圖以六圓挾一圓只云乙圓徑捲丙圓徑捲丁圓徑捲戊圓徑捲己圓徑捲庚圓徑捲問甲圓徑幾何

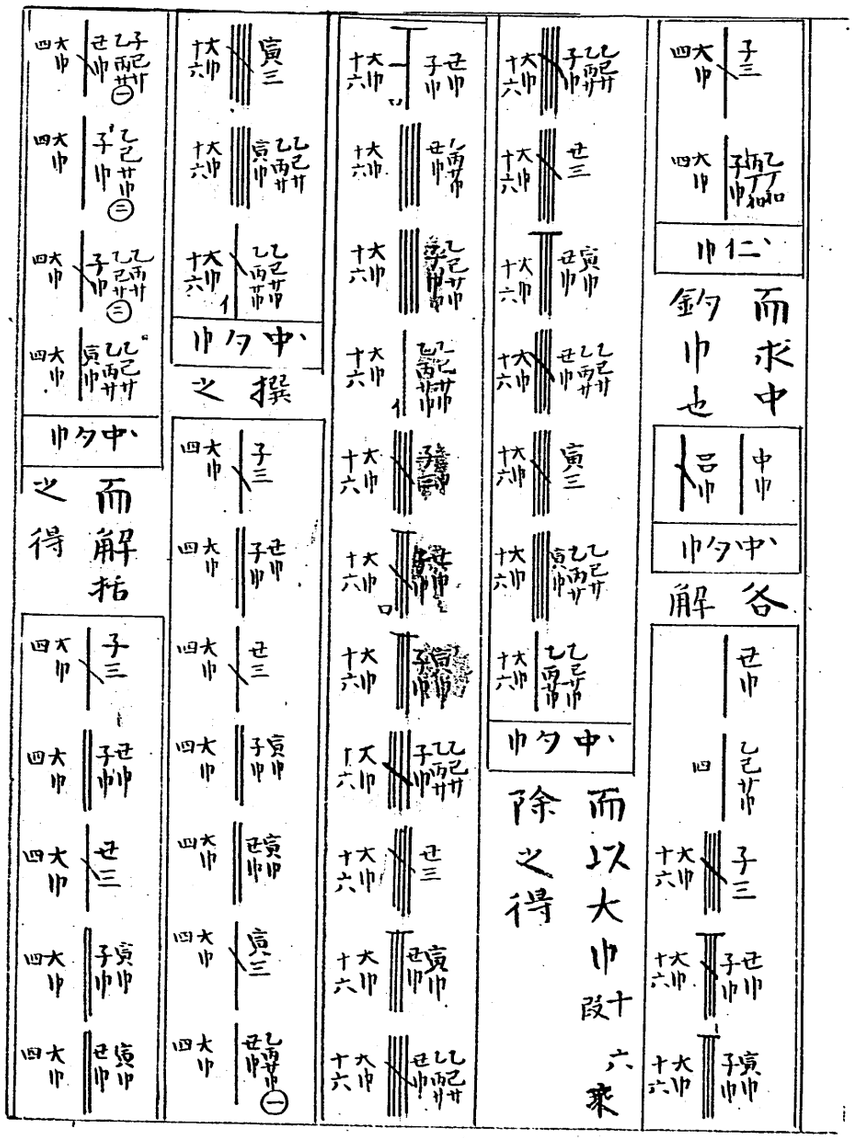
答曰

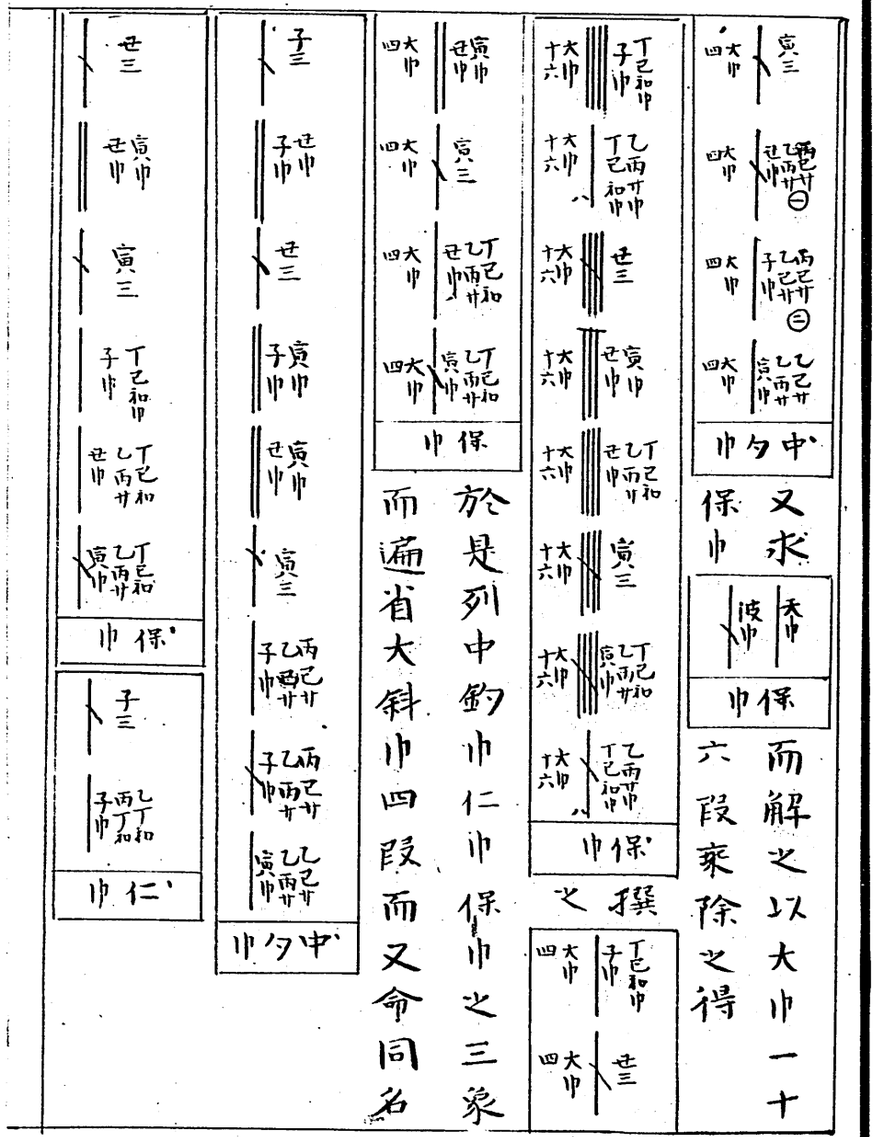
矩曰列先所求之通矩合而換名求廿寅矩合






依此矩合求壬巾及
寅巾而求后各得
寅矩合
伊而求之各撰解之
伊之括
甲
乙
丙
丁
戊
己
庚
天
地
人
中
大
小
子
丑
寅
伊
呂
波
仁
巾
而求波呂
而括之得
解之括之
以大巾六十乘除解之
又解括之得
撰之
解各
中句
保
天
地
人
仁
巾


而求中鈞巾也
各解
而以大巾十六段來除之得
中勺巾
撰之
而解括之得
中勺巾


又求保巾
而解之以大巾一十六段來除之得
中勺巾
撰之
於是列中鈞巾仁巾保巾之三象而遍省大斜巾四段而又命同名
中勺巾
保巾
仁巾

於是求矩合之

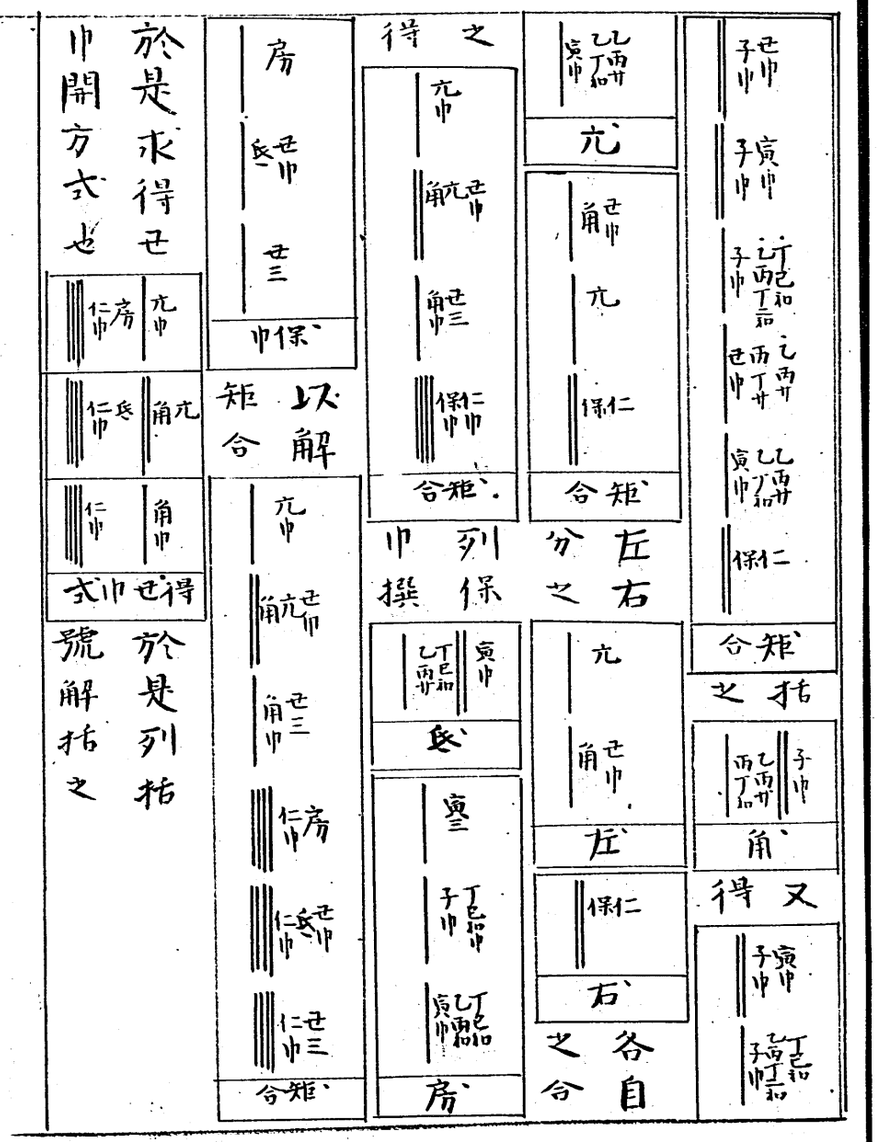
左右分之

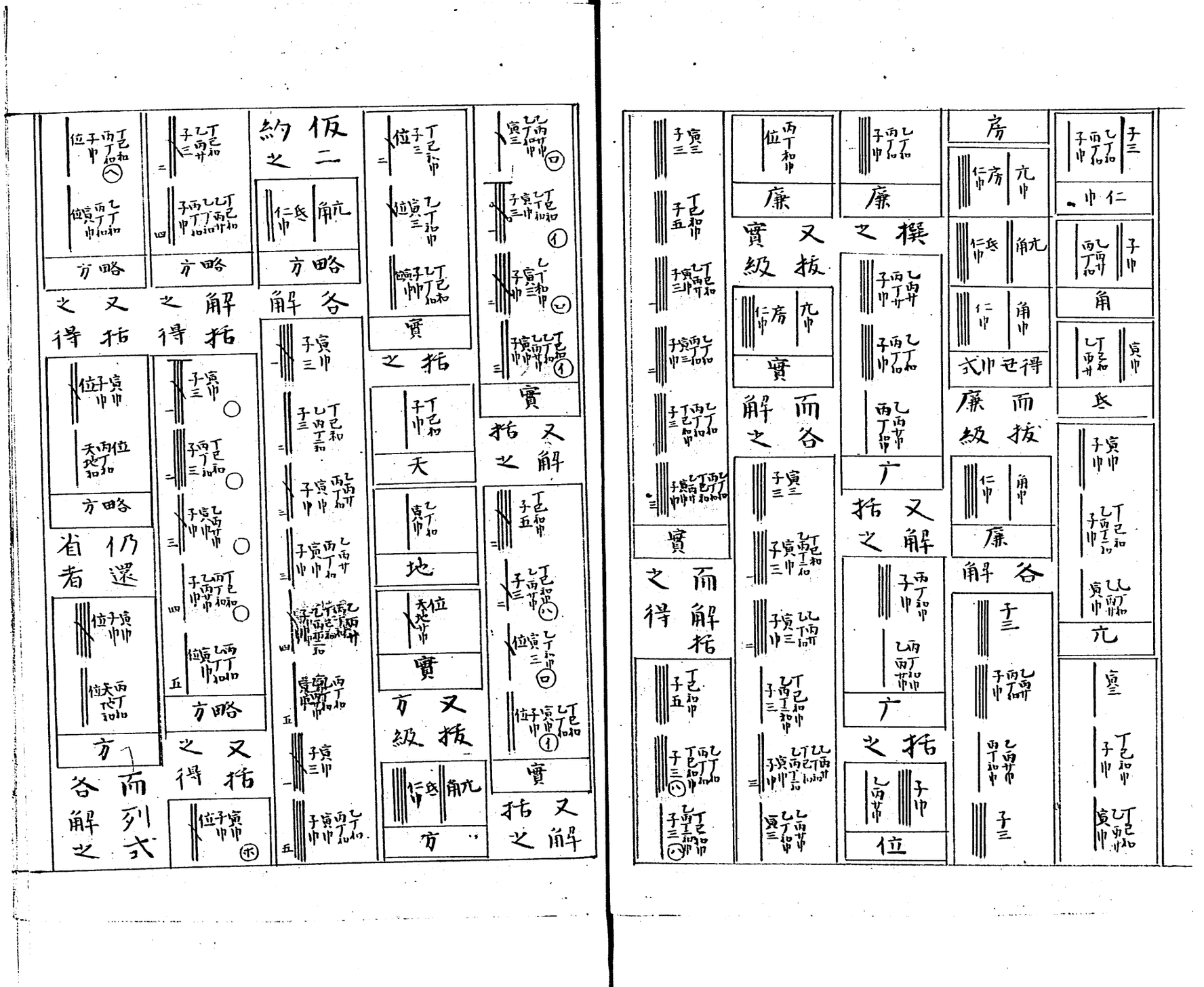
各自之合

於是中鈞巾保巾仁巾各解之而得

於是撰之求矩合又解之而拓之

得




仮二約之略方
解各略方
括又得之略方
仍選省者
而列式各解之
括又得之略方
實
括又解之
方又級拔
實
括之
天
地
實
實
括又解之
實
而解得括之
實
廉又實級拔
解而各之
廣括又解之
廣括之
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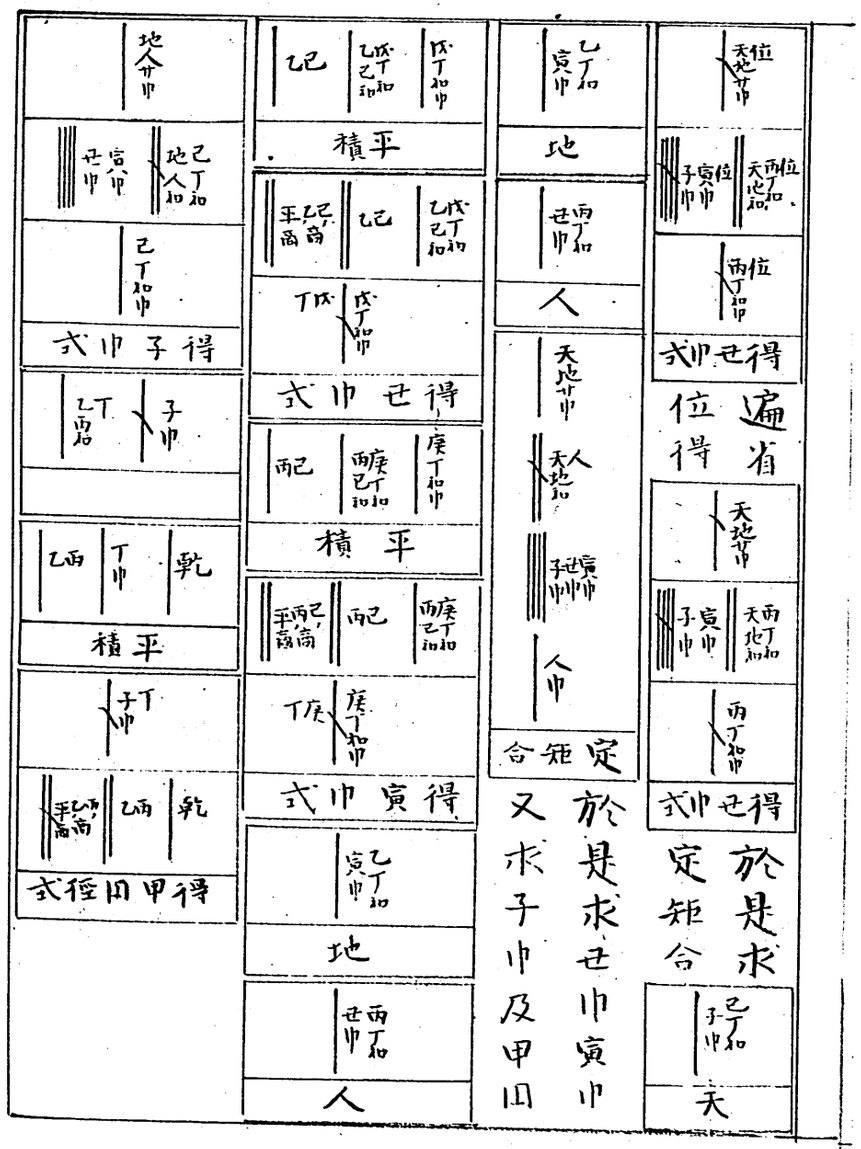
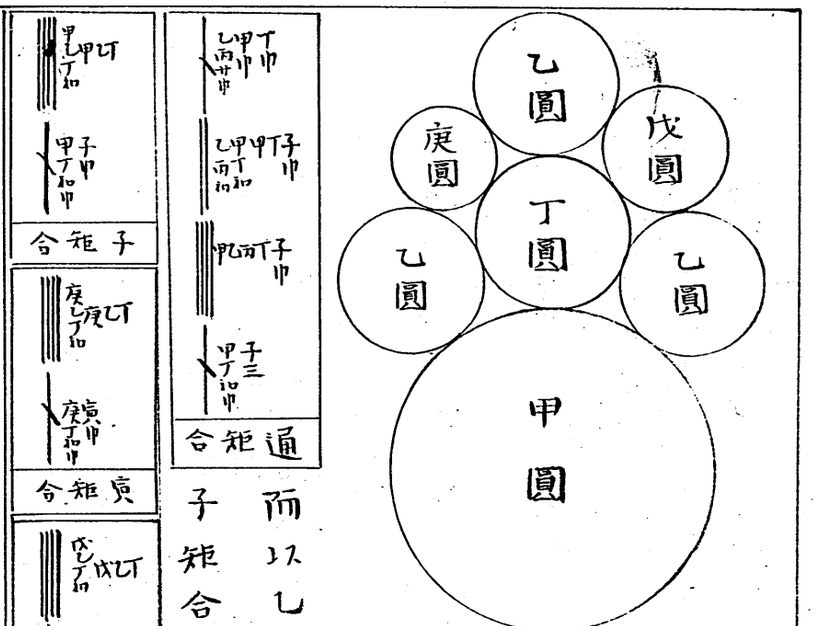
房



術曰乙己圖徑二字略之相乘名角戊丁和名亢乘乙己和名底加角及亢巾乘角開平方加角倍之加底乘戊及丁以亢巾除之名丑乘丙丁和名人丙己相乘名房庚丁和名心乘丙己和名尾加房及心巾乘房開平方加房倍之加尾乘庚及丁以心巾除之名寅乘乙丁和名地加人乘己丁和內減丑因寅二段名箕自之內減己丁和巾因地人差巾余開平方加箕以己丁和巾除之名子以減丁因乙丙和名乾乙丙相乘名斗加乾及丁巾乘斗開平方倍之以減斗段二乾和余以除子因丁得甲圓徑合問

列通矩合

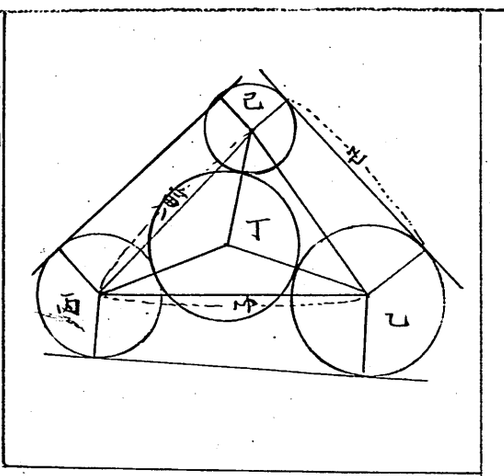


今有如圖以六圓挾一圓只云乙圓徑若丁圓徑若戊圓徑若庚圓徑若問甲圓徑幾何

答曰

矩曰列前所求通矩合而以乙換丙解括之遍省過來求子矩合又換名求丑寅兩矩合也

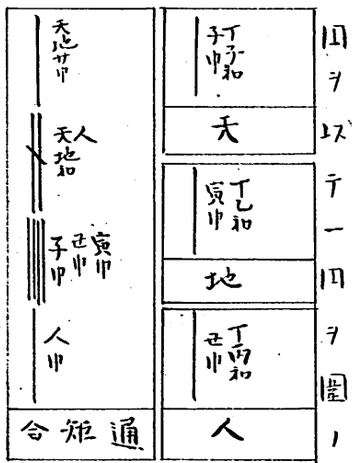
又列右所求之括號及定矩合也



即圓ノ如シ故ニ三圓四五圓六圓七圓八圓及ヒ矩合ヲ以テ乃チ子丑寅卯次逐線次得通術然次ニ圓ノ題ニ起リ通矩合ナリ

其術ヲ以テ子丑寅卯次三線ヲ求メ又其等ヲ用ヘテ甲ヲ用ヘテ甲圓ニ等類

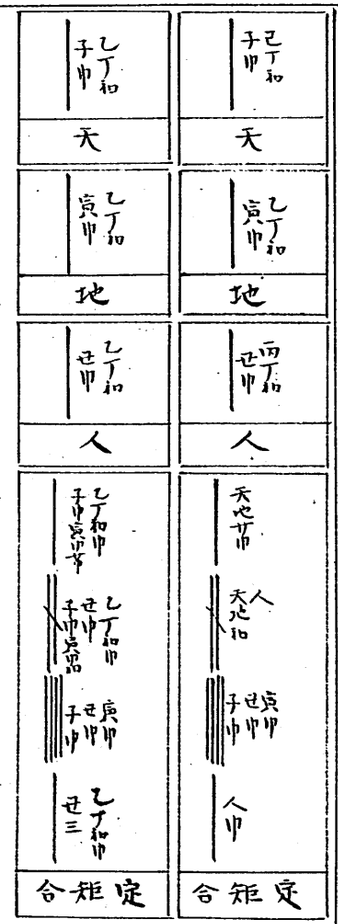
寅ノ三線及ヒ乙丙丁己ノ四圓ヲ用ヘテ得タル通矩合ハ子丑寅卯ノ三圓ニ用ヒテ戊庚ニ用ヒテ甲ヲ求ルナリ此即チ數万圓ニ至ルト云フ所ニ速ニ算類



評曰此通矩合ハ六圓ヲ以テ一圓ヲ圍ノ題ニ拠ル

然ルニ戊庚ニ用ヒテ甲ヲ求ルナリ

所得ノ題ハ

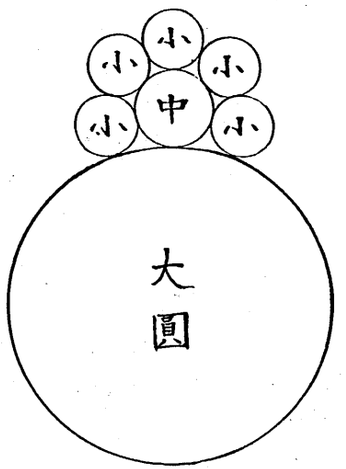


而以乙換
丙及己得

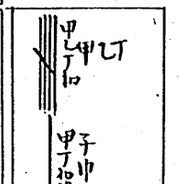
今有如圖以大圓一個小圓五個圍中圓只云中圓徑若干若干問大圓徑幾何

答曰

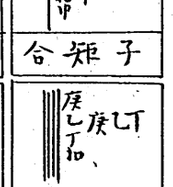
矩曰



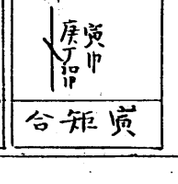
列石所求之子丑寅三件矩合



子矩合

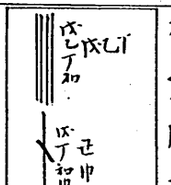


寅矩合



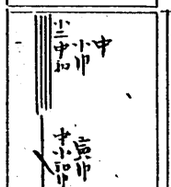
丑矩合

而各換名

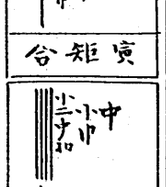


丑矩合

子矩合

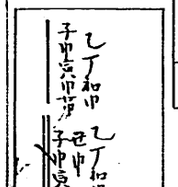


寅矩合

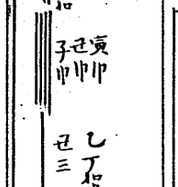


丑矩合

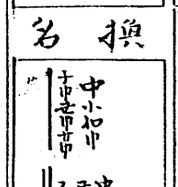
而列定矩合得



定矩合



換名



矩合

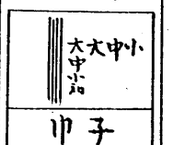
解拓之遍

省子巾得

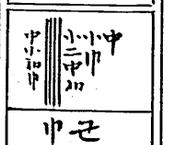
矩合

而求子

巾廿巾



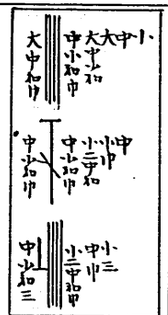
巾子



廿巾

以各

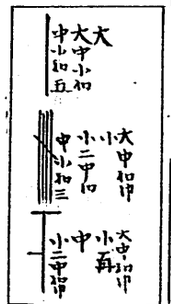
解之



矩合

遍省中小

四段來除象

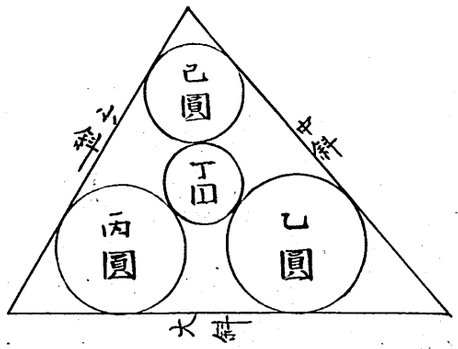


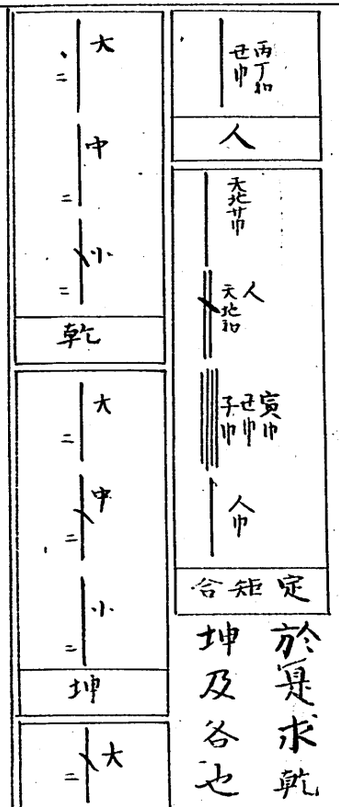
矩合

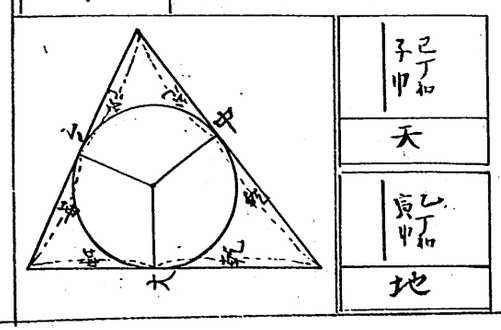
今有如圖三斜內容四圓只云大斜若中斜若小斜若乙圓徑若丙圓徑若己圓徑若問丁圓徑幾何

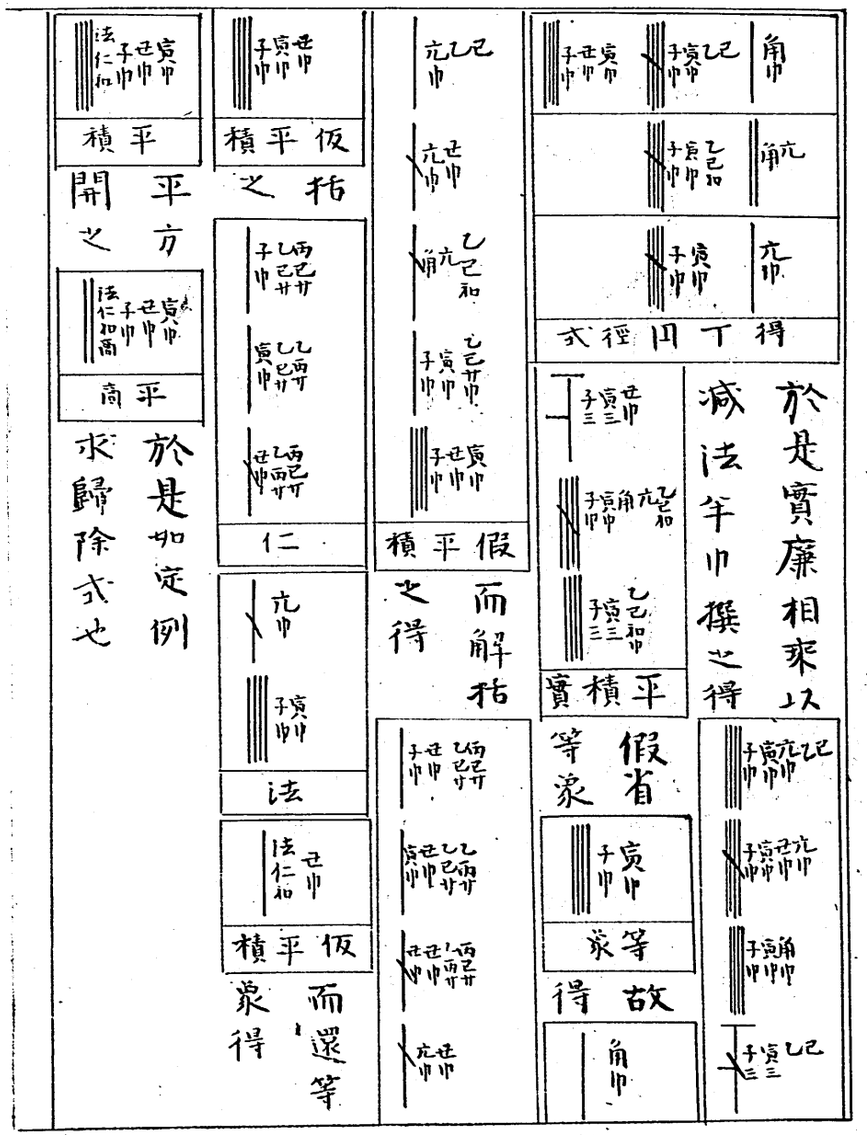
答曰

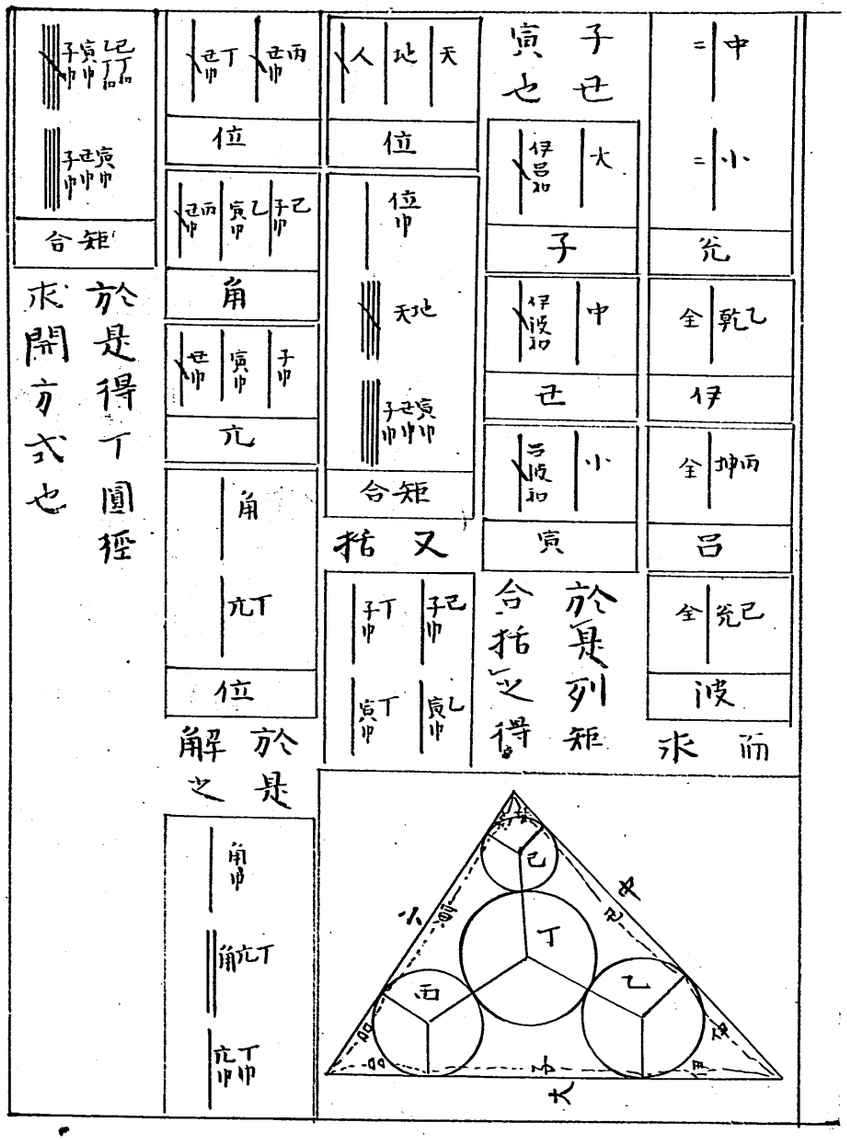
矩曰依術求子丑寅而后列所得定矩合於是求乾坤及各也








於是實廉相乘以減法年巾撰之得
平積實
假省等衆
衆等
故得
角巾
得丁圓徑式
而解括之得
假平積
括之
仡平積
而選等衆得
於是如定例求歸除式也
平積
開平方之
平商


於是得丁圓徑求開方式也
合矩
於是解之
位
角
亢
位
位
合矩
括又
於是列矩合括之得
而求
子丑寅
子
丑
寅
伊
吕
波
中
小
乾
坤
己
丁
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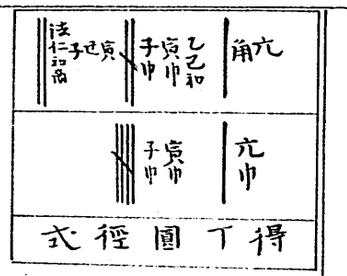
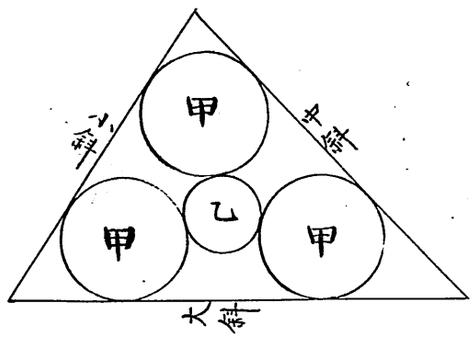
丙
小
大
大



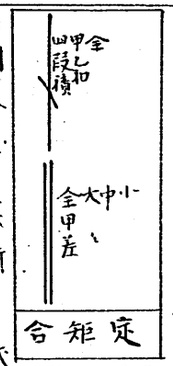
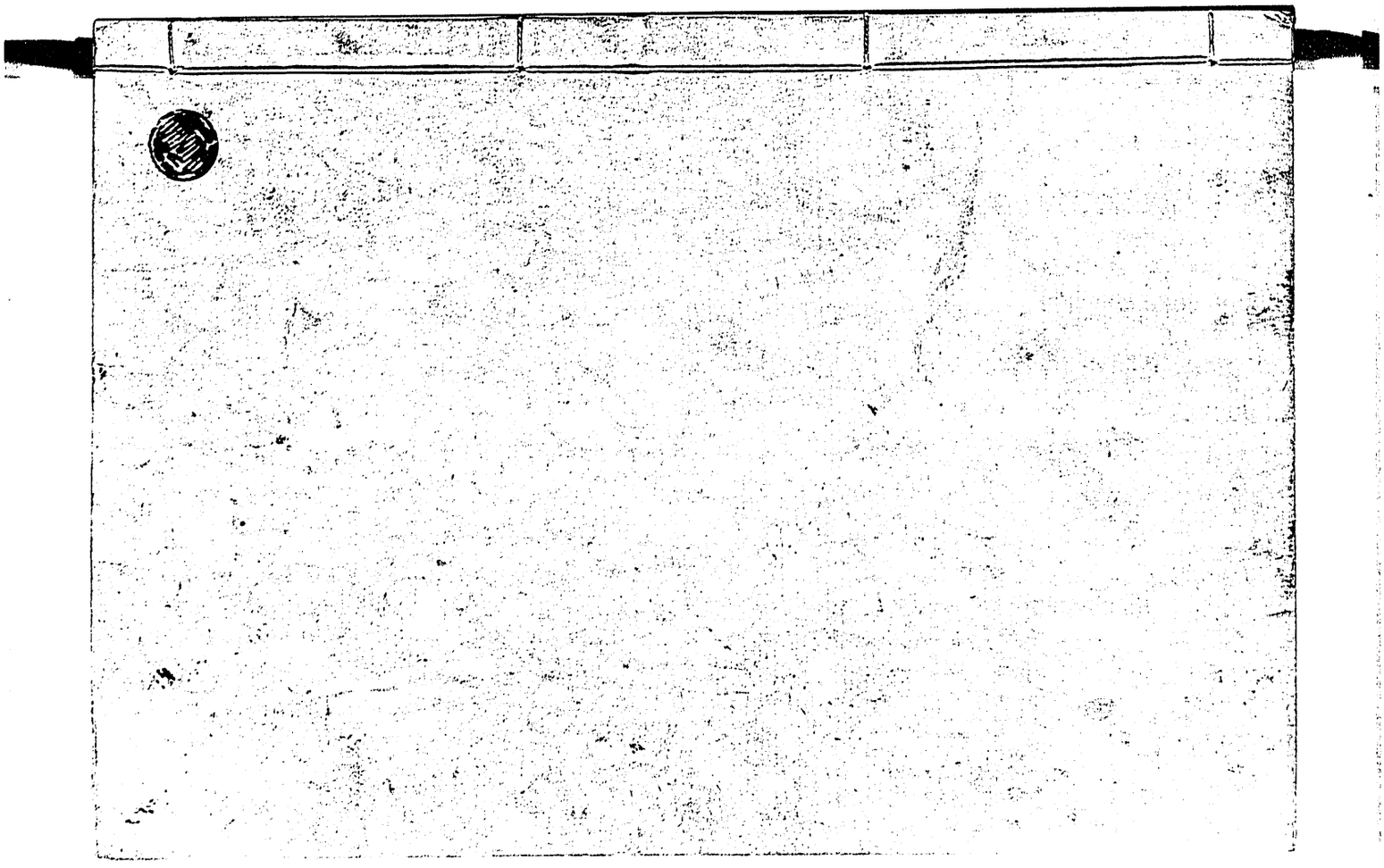
術曰別求全徑大中斜內減小斜余半之名乾以減大斜名坤以減小斜餘除來己徑全徑名波列坤除來丙徑全徑名呂列乾而除來乙徑全徑名伊加呂以減大斜名子以呂波和減小斜名寅以伊波和減中斜名壬子巾寅巾和內減壬巾名地自之以減子巾因寅巾四段名人子巾來己徑加乙徑因寅巾內減丙徑因壬巾余來地名天子巾來丙己徑差加乙丙徑因寅巾來乙己徑差加人內減乙丙徑差因丙己徑差因壬巾除開平方來己內減乙己徑和因子因寅余來子及寅倍之加天以人除之得丁徑合問

今有如圖三斜内容四圓只云大斜十一寸五中斜一十四寸小斜一十三寸甲圓徑四寸八分問乙圓徑幾何

答曰乙圓徑一寸七分



矩曰列右矩合以甲圓換乙丙己三圓而解括之遍省過來得定矩合也



評曰此條ノ答術ハ別書ニ見ヘタリ故ニ爰ニ載スル及ハズ然レドモ此定矩合ハ以六圓圍一田ノ通術ニ起リ屢通レテ爰ニ至ル而此條ノ題數ヲ用ヘテ其術ヲ試レハ恰モ合ス此即前條ノ通術共ニ眞ノ通術ナルヿヲ試ン爲ニ是ヲ設ルノミ